

# JOURNAL of the American Veterinary Medical Association

FORMERLY  
**AMERICAN VETERINARY REVIEW**

(Original Official Organ U. S. Vet. Med. Assn.)

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## CONTENTS

|   |     |
|---|-----|
| Editorial .....   | 277 |
| Papers:   |     |
| The Veterinary Curriculum—Veranus A. Moore.....   | 283 |
| Sequelæ of Canine Distemper—William E. Muldoon.....   | 297 |
| Diseases of the Cornea—H. J. Milks.....   | 310 |
| Equine Infectious Anemia—R. A. Kelsor.....  | 319 |
| Bot Anaphylaxis—A. E. Cameron.....  | 332 |
| Pathogenicity of <i>Bacterium Suisepitica</i> for Hogs—A. F. Schaik and<br>L. M. Roderick.....  | 343 |
| The Application of Vajda's Method to the Examination of Fox<br>Feces—J. A. Allen.....   | 349 |
| Some Attempts to Control Strongyles in Aneurisms by Means of<br>Intravenous Injections of Drugs—Maurice C. Hall and Jacob E.<br>Shillinger..... | 353 |
| Gastroenteritis in Small Animals. (Discussion of Paper by O. V.<br>Brumley).....  | 357 |
| Clinical and Case Report:   |     |
| Potassium Nitrate Poisoning in Chickens, With a Note on Its<br>Toxicity—John E. Guberlet.....   | 362 |
| Abstracts .....   | 366 |
| Review .....  | 370 |
| Association News:   |     |
| Proceedings of Fifty-Ninth Annual Meeting, A. V. M. A.....  | 371 |
| Other Meetings .....  | 404 |
| Communications .....  | 409 |
| Miscellaneous .....   | 410 |

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J. R. MOHLER, Editor, Washington, D. C.

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**DUTIES OF COUNTY AGENTS LIMITED**

SECRETARY WALLACE issued a statement in the September 6 issue of *The Official Record* concerning the relation of Federal cooperative employees to agricultuereal organizations. After quoting section 2 of the act of Congress approved May 8, 1914, the Secretary says:

"It is thus made clear that the work of the cooperative extension employees, whether county agents, home demonstration agents, boys' and girls' club agents, or other cooperative extension workers, is educational. These extension workers are public teachers, paid with money largely raised from all of the people by taxation, and are charged with giving instruction and practical demonstrations in agriculture and home economics. Their work covers the entire rural field, which includes economic production, economic marketing, and the development of better home, community, and social conditions.

"As they are public teachers, it is not a part of the official duties of extension agents to perform for individual farmers or for organizations the actual operations of production, marketing, or the various activities necessary to the proper conduct of business or social organizations. They may not properly act as organizers for farmers' associations; conduct membership cam-



paigns; solicit membership; edit organization publications; manage cooperative business enterprises; engage in commercial activities; act as financial or business agents, nor take part in any of the work of farmers' organizations, or of an individual farmer, which is outside of their duties as defined by the law and by the approved projects governing their work. They are expected, however, to make available to organizations such information as will be helpful to them and contribute to the success of their work."

In referring to the Secretary's statement, *The Pacific Dairy Review* for October 5 says in an editorial:

"The Secretary of Agriculture, we are convinced, has done a wise thing at the right time in issuing a ruling under which the duties of county farm agents are more clearly defined. We say it is wise because we believe it is in the interest of the system. That the original purpose of the law and the appropriations to carry it out was purely educational there is no doubt whatever \* \* \*. The farm bureau agents have from the start been under the fire of reactionary interests that do business with the farmers and the ruling of the Secretary of Agriculture is opportune in settling a serious complication and we have no doubt but that it will be especially welcomed by the county agents themselves."

*Implement & Tractor Trade Journal* for September 23 says in an editorial:

"At last the work of the 'county agent' has been officially defined! In issuing his statement of definition Secretary Wallace virtually issues an order commanding all agents to desist from those activities in which they have no proper business and which, in one way or another, have created dissatisfaction with the enterprise of the farm bureaus on the part of farmers themselves, the mercantile community and citizens at large. In his official definition Secretary Wallace declares the county agent's duties to be essentially 'educational.' The head of the department is right, of course."

Here and there county agents have conceived it to be their duty, and in some instances they have been urged or it has been demanded of them, to help farmers buy and sell their supplies and products cooperatively and perform other commercial services which do not properly belong to them. It would seem

that the habitual immunization of hogs against hog cholera and otherwise treating animals for various ailments also come under the ban. Such services cannot be regarded as "educational" duties or "practical demonstrations in agriculture and home economics." They cannot be regarded otherwise than as commercial services.

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### BOTULISM IN SCOTLAND

ACCORDING to the British press of August last, quite a tragedy occurred at the Loch Maree Hotel in one of the north-western counties of Scotland, as the result of botulism, which caused the deaths of five guests and a servant, who were members of a picnic party, the organism having evidently occurred in meat-paste sandwiches which the victims had partaken of.

In an interview given by Dr. J. C. Ledingham, chief bacteriologist of the Lister Institute, London, who confirmed the diagnosis, he stated, which to us seems rather remarkable, that "we have not had a case of botulism in human beings reported in Great Britain before to my knowledge, although there have been many cases in America," etc.

The doctor further stated that botulism among horses had been very prevalent in the north of Scotland, and had caused the deaths of many animals during the previous few months, although that, of course could have had nothing to do with the Loch Maree outbreak, the cause in the horses evidently being infected forage.

Touching the term "ptomaine," Dr. Ledingham suggested that it ought to be abolished, as it meant nothing; and that the great majority of so-called ptomaine cases were bacterial in origin, and not due to any chemical product of putrefaction.

There were two points in the published reports in connection with the outbreak which attracted our attention, viz., the evident scarcity, up to the present at least, of botulism in human beings in Great Britain; and the rather extensive outbreak among horses in the north of Scotland, as we had not previously seen any account of the latter in the British veterinary press, which would probably suggest that botulism in horses is also rarer over there than it is with us in the United States.

W. H. D.

### CONSISTENCY, THOU ART A JEWEL

WE NOTICE, with considerable surprise, that a number of our prominent members of the profession, few, if any, of whom, however, are dependent upon practice for a living, have contributed articles on animal diseases to a popular work for farmers and stockmen which is published by one of our great department stores.

In extenuation it may be said, of course, that if they had not written such articles, others would; and that it was better to have them correct and up to date than to have them contributed by those who were not so well posted. We can not get ourselves to believe that that is a sufficient excuse, from an ethical standpoint, as we are of the opinion that such information might be made to reach the public through a more ethical channel than a department store publication, the sole object of which is to increase the sales of the merchandise handled, including the publication mentioned, and certainly not the advancement of the veterinary profession from a scientific point of view.

It is evident that some of the leaders of the profession must "grade" their ethics, and adapt the grades to circumstances, whatever the latter may be. However, one of the "grades," which we can not quite comprehend, is, when men at the head of veterinary institutions, who are presumed to graduate men to make their living by their practice, can circumvent the prospects of the latter by contributing articles on animal diseases to a work published by a commercial concern, which is likely to get into the homes of the great majority of the stock owners of the country. It seems paradoxical, to say the least; but, like "postum," there may be a reason. It seems so hard to be consistent. At the same time, "Consistency, thou art a jewel."

NOBLESSE OBLIGE.

### VICTORY FOR FOREIGN DRUGS

IN THE HASTE of last-hour legislation, and particularly through the compromise on drugs and dyes made by the congressional conferees on the tariff bill, American organic chemical industry is faced with a discouraging situation. The earnest work of the last six years to make the United States self-sufficient in the matter of synthetic drugs and necessarily the interdependent dyes, the concomitant enthusiasm for the chemical profession stimulated in our universities, and a large amount



of capital invested in plants, are about to be sacrificed. The prewar condition of foreign domination of our materia medica is imminent, a period when it seemed that any product which could not be used as a dye was quickly added to the increasing list of synthetic drugs. Thanks to American control, physicians no longer are being flooded with advertisements of new unessential synthetics, while the really valuable drugs are being made in this country in adequate quantities; the drugs are pure and the prices are fair. Under the legislation just passed, the drugs and dyes derived directly from coal tar received some protection—though inadequate—based on American valuation. On the other hand, the synthetic chemicals of non-coal tar genesis (about 30 per cent of all organic chemicals), including many valuable drugs, received no practical protection; they may be imported on a 25 per cent duty based on foreign valuation. Furthermore, it is stated that large stocks of dyes and medicinals taken in lieu of reparations, costing relatively little, are held in England, France, Belgium and Italy. Yet these countries are protecting their own industries by embargo or measures similar to the recently terminated license import system of this country. It is asserted that this enormous surplus material will be shipped immediately to the American market. Development of the next few weeks will be watched with anxiety by those interested in organic chemistry in the United States; and if the predicted dumping of these products from Europe on the American market actually does occur, a renewed effort should be made at the December session of Congress to protect the basic key industry so necessary for the conservation of health as well as national security.—*Editorial in the Jour. Amer. Med. Assn., Sept. 30, 1922.*

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### AGAINST LIFE-SAVING

(From *The Outlook*, October 25, 1922)

COPIES have been sent us of so-called antivivisection bills introduced in Colorado and California; we are told that in the latter State an attempt is to be made to secure indorsement from the voters at the coming election. We strongly urge any voters before whom the question may come to refuse to indorse the measure. Certainly they should not do so unless they know just what it means.

The California bill bears the misleading caption, "An act

prohibiting the vivisection or torture of human beings or animals." But in the text we find that "the causing of any deformity, *sickness*, or disease in or to any living creature for experimental purpose" is punishable. Now, it may be wrong to give a mouse a new drug or inject in him a new serum, but it certainly is not "vivisection or torture" unless it is "vivisection" to inject the new diabetes serum in a human patient or "torture" to give him a dose of calomel. The major part of the antivivisection argument is based on the horror caused by the sound of the word vivisection, although the thing sought to be restrained is not torture but mild experimentation from which (as has been demonstrated beyond question) both the human and the animal world have benefited enormously.

The present California law allows "properly conducted scientific experiments or investigations performed under the authority of the faculty of a regularly incorporated medical college or university of this State." The new bill repeals this provision, and thereby brands all the State's colleges and medical schools as cruel. Could fanaticism further go! An attempt is made to get the trapper and farmer vote by allowing amateur barnyard operations and ignoring the suffering or starving of tortured trapped animals.

The Colorado bill has a mild title referring to "experimental operations or administrations"; but the text defines among the things included anything which may "cause pain or suffering in any part or any organ"—a wide-open definition.

A refreshing contrast to these bills comes to us simultaneously. It is a resolution passed by a vote of about 600 to 20 by the Pennsylvania State Federation of Women putting on record "their gratitude to medical science for past discoveries so profoundly beneficial to human beings and to animals, and we believe that such beneficent researches should be continued and encouraged."

A valued correspondent calls attention to the benefit of animal experimentation in saving animals from death and suffering and in food values. Thus in six years through the use of a serum discovered by animal experimentation the loss from hog cholera was cut down by about \$47,000,000. The illustration might be multiplied.

If there is any real cruelty or malicious torture going on, by all means let it be stopped. But don't be misled by hysterical language.

## THE VETERINARY CURRICULUM<sup>1</sup>

By VERANUS A. MOORE

*Dean, New York State Veterinary College at Cornell University,  
Ithaca, N. Y.*

FOR MANY YEARS this association struggled to raise the entrance requirements for recognized veterinary colleges to a reasonable standard. There were then two clearly defined groups among veterinarians on that subject. One, knowing what the practitioners had done and still were doing, was content to have progress checked and practice continue as it was. The other recognized that we were in the midst of a constant discovery of facts and new truths that could be understood and applied only by educated and trained minds. These latter insisted on a preliminary education sufficient to enable a student to understand the sciences on which the art of veterinary medicine rests. The outcome was the declaration by the association, and later by the Government, that four years of high school, or its equivalent in academic work, was the minimum preparation for matriculation. The colleges that could not require it have closed their doors.

In like manner the length of the course of study was slowly and grudgingly extended from two sessions of five months each to four full academic years. The methods of teaching also have changed. At first the full curriculum was given each year, as in human medicine, and after a student had repeated it he could take the examination and graduate. At present the course is graded and the subjects are taken in what to the teacher seems to be a logical sequence.

Today our colleges are confronted with educational problems more difficult to solve than the raising of the entrance requirements and the lengthening of the course of study. In fact, the prerequisites may have to be reconsidered and the time devoted to the curriculum extended before a satisfactory solution is obtained. Fortunately there are no longer opposing groups of men, each seeking a different verdict. We are unanimous in the belief that the curricula that are to be followed

<sup>1</sup> Presented at the fifty-ninth annual meeting of the American Veterinary Medical Association, St. Louis, Mo., August 28 to September 1, 1922.



should be those that will best prepare our students to meet the ever-increasing and exacting demands on the veterinarian.

Our veterinary colleges are no longer schools to prepare men to diagnose and treat the ills of individual animals alone, but rather institutions where not only instruction in animal diseases and their treatment is developed highly but also where animal hygiene and sanitation, animal husbandry, dairy and meat inspection and the relation of animal diseases to public health are given proper consideration. The veterinarian must cease to be merely a doctor, a "tinker" of sick and injured animals. He must become the leader in the animal husbandry of his community and the protector of the human family from the diseases of animals communicable to man. His services are needed constantly by the livestock owners to solve the problems in breeding and feeding to the end that the losses from disease may be lessened.

Those of us who are charged with the responsibility of directing veterinary education feel that the curricula now followed do not meet fully the obligations of the schools either to the profession or to the animal owners. We are all too often disappointed in the degree of success attained by young graduates whom we believed to be capable, qualified and enthusiastic in their work. Again, we are often told by those who have followed the prescribed course and have gone into the practice of their profession that they do not find themselves as well prepared for their duties as they should be. Further, animal owners not infrequently make the observation that the recently graduated veterinarians are not as well disciplined in the principles underlying their work as they had expected to find them. These rumblings, suggestive of imperfection, are signals that should be heeded. They do not indicate necessarily that there is violation of any fundamental principle in pedagogy, but that readjustments are called for. The profession occupies a more important position in the eyes of the public than at any previous time. It is operating under different conditions than heretofore, and, consequently, changes of procedure are required to articulate it with the varied interests served.

At the present time the veterinary profession is in a somewhat critical state. The growth of knowledge in animal husbandry and agriculture generally has been quite as rapid as it has been in medical lines. The public has a better understand-

ing of the symptom-complex of disease, its cause, prevention and treatment, than heretofore. For that reason the wealth of new knowledge in the basic sciences and the more thorough courses in veterinary colleges have not given veterinarians much actual advancement over the time when both they and the public were less informed. Nevertheless, the opportunities for veterinarians to establish points of contact with animal husbandry on one side and public sanitation on the other are greater because of a keener appreciation of the helpfulness of one to the other. This does not lessen the obligations of the schools. They must teach the subjects necessary to qualify their graduates to do efficiently their professional tasks and to satisfy the owners that they have been done properly. The efforts of the practitioner are being judged by a public far better qualified to pass on the character of his work than it was before the advent of agricultural colleges. The employers of veterinarians are often thorough students of breeding, feeding, hygiene, or the principles of preventive medicine, and therefore intelligent judges of the work of the practitioner. In these circumstances the securing of a training broad enough in its range of subjects and thorough enough in the details of each to meet the present-day demands is a difficult task to be accomplished in a four-year curriculum with only a high-school preparation.

In trying to analyze the subject I soon found that it was not a matter for a single person or school to adjust. The importance just at this time of being secure in the educational part of our profession convinced me, perhaps without sufficient evidence, that the curriculum was the cornerstone of veterinary service. I was so deeply impressed with the necessity of ascertaining if our courses of study conformed to the progress that is being made in animal husbandry and sanitation that I decided to bring the subject before this section for analysis, and I hope constructive criticism. In the forward movement of veterinary education and service the curriculum seems to be the first factor for each of us to deal with. In this connection I am assuming that the teachers possess a full measure of knowledge, that the students have been prepared properly and have lofty ideals, and that adequate facilities are provided. Each of these is an integral part of the composite of college training,

and if one is missing, the true value of the others can not be determined.

The preliminary education of the student has much to do with the success of a curriculum. Many of the failures on the part of graduates are traceable not to the course of study in the professional school, but to the lack of preliminary training and discipline. The character of the teaching the boy has had determines to a large degree his ability to profit by the instruction in technical schools. It is essential for the student to have a good general education as a background for his special training. However, we must be careful in adjusting a course of professional studies not to expect more than can arrive through the approach provided. There is an eternal "fitness of things" that can not be removed and which always should be taken into account. The good preparatory schools, as President Hadley said of liberal arts colleges, are institutions "where students learn things that they are not going to use in future life by methods that they are going to use. The former element gives the breadth, the latter element the training." I believe it is the mental training that comes through good and inspiring teachers rather than the subjects taught that prepares the boy for the serious study of medicine.

The curricula that are being followed in the veterinary colleges are the products of a long evolution of ideas of what an efficient veterinary course should be. Each faculty has tried to make its course comprehensive and thorough. Each of the eleven curricula examined has a tinge of provincialism that is characteristic of the college or university from which it sprang. These evidences of individualism are to be commended, for they are expressive of local needs or the genius of strong men in the teaching staff. Notwithstanding the excellence of the individual courses, I am constrained to call attention to a few matters of much concern to the veterinary profession because they bring its members in closer contact with the problems they have to solve. It is not my purpose to attempt to formulate a standard curriculum, but rather to call attention to a few modifications that I believe may be made with profit to all.

The first change I would suggest pertains to the organization of our curricula. My thought in this connection is to arrange the subjects that are common to all schools in the same sequence, thus securing uniformity in the year of the



course for each subject. I recognize that there are honest differences of opinion as to the logical prerequisites for the basic subjects, but that does not preclude the desirability of uniformity in the order of study. The strongest argument against an inviolable sequence of subjects is found in the variation in the order in which they are given in the existing courses.

My reason for urging this uniformity is to simplify the transfer of students from one college to another. It happens frequently that, for good and sufficient reasons, students, especially from States where there is no veterinary school, find it advantageous to change from the college they are in to another. Such students find, quite to their dismay, that in the college they wish to attend there are basic subjects taught in the year or years they have passed and which they have not had. This difference in the mechanism of the curricula is perplexing, for in spite of the desire of the student and the willingness of the faculty, the transfer is made difficult or impossible.

Another reason for easy transfer is that there are, and there probably always will be, outstanding men among the teachers of the different subjects in the various colleges. It is not likely, and it should not be, that any one school will have in its faculty the most thorough, inspiring or influential teachers in all of the subjects. From the very nature of things veterinary practitioners must do a general practice. To render service they must deal with all the diseases of all species of animals in their community. There are opportunities for, and there should be, a few specialists. They must depend very largely, however, on clients who can afford to call a veterinarian from a long distance, and on small-animal practice, where the patients may be sent to the specialist as in human medicine. The veterinarian who serves a community must go very largely to his patients, and there are not sufficient cases of a single disease in a restricted locality to support a specialist. The development of community interests is tending gradually, and in many places already obtains, to unify the livestock industry of localities so that the dominating business in livestock is dairying, raising of beef cattle, swine, sheep or poultry. As a rule, the dominating species of animals in a community determines the specialization of the practitioner who serves it. The colleges, therefore, must furnish instruction adequate for all of the so-called specialties and include it in the regular course. The tendency

toward this limited specialization is stimulating students who are preparing for a particular line of work to transfer, when they come to this subject in their course, to the college that has in its faculty the most distinguished teachers in that field. If the colleges are to serve the public by preparing veterinarians, it would seem that they should make such transfers as easy as possible. There may be other reasons, but those I have mentioned are quite enough to justify reasonable effort to unify the sequence of subjects in our curricula.

The second question is in relation to the subject matter to be taught. Those who have watched the growth of new knowledge in their particular field of study, with the point of view of the teacher, realize that the time devoted to the subject in the curriculum is becoming rapidly out of proportion to the number of facts the teacher feels should be imparted to the student. While this statement may not be applicable to all departments, in some it is a matter of much concern. A hurried, superficial survey of the entire subject does not discipline the student in the fundamental facts and principles that he is to utilize in practice. If a thorough drill is given in the foundation facts the time is consumed before the subject is covered. Which course should be followed? Would it not be better to select, through a committee of teachers, the topics that should be presented?

Another point intimately associated with the choice of topics is the subdivision of departments dealing with fundamental subjects into separate departments and general courses into separate units of instruction. For example, in the subject of bacteriology, should separate courses be organized to teach the different integral parts such as "the life conditions, function and classification of bacteria," "serum and vaccine therapy" and "immunology," or should they all be combined in a comprehensive course in microbiology? Again, should microbiology be in a department separate from pathology? The latter includes both etiology and tissue changes, while the former deals with the causes only. Can these subjects be taught better, from the veterinarian's point of view, together in one department or in separate and independent departments? Again, the teacher of anatomy is confronted with a like problem. For years the study of this subject was restricted to the horse because the practice was confined to the equine species. Today practice includes all farm and pet animals. The diseases of cattle, swine and

poultry are being studied and treated quite as thoroughly as those of the horse. With this change in practice, what anatomy shall be taught in the time allotted to the general subject and what shall be omitted? As the general practitioner can not be a specialist in all of the sciences that contribute to the sum total of his professional knowledge, it behooves us as teachers to bring forward the facts and principles in our respective sciences that will be most useful to the graduate. The practical parts of a subject can be taught just as scientifically as any other. I believe, therefore, that the choice of topics is a matter of vital importance for the curriculum. Until recently the need for selection has not been serious, but now that the wealth of knowledge in every subject is so vast that the teacher has not time to present it or the student capacity to learn it, the choice of subject matter has become a veritable problem. For these reasons I have made bold to raise the question and to appeal to the teachers to differentiate the topics to be taught in the subjects called for in the curriculum and those that must be acquired later.

The third and last question I wish to raise is whether or not we are including topics enough in animal husbandry, dairy industry, poultry culture, milk hygiene, meat and food inspection and possibly others that correlate veterinary medicine with agriculture and the public welfare. A study of the curricula now in operation shows that many of these subjects are taught in some of our colleges and omitted in others. Again as only a high-school diploma is required for entrance, should there be included in the curriculum such subjects as English, economics, business law, modern languages or public speaking as part of the professional course? One or more of these subjects are taught in a few of the colleges. If they are to be included, as an aid to general culture, which of the technical courses should be omitted? The pedagogical principle that too many subjects can not be taken successfully at one time precludes overcrowding the schedule. In our experience professional studies and those in liberal arts when taken together have not been compatible. The curricula of eleven of our colleges show that, as a rule, general cultural courses are not numerous, although the need for them, as well as those of technical agriculture, is strikingly in evidence.

The opinion has been expressed that the veterinary curricu-

lum should contain more subjects pertaining to agriculture. There are those who have encouraged the substitution of a limited number of such subjects for an equal number of hours in the veterinary curriculum when the candidate is a graduate of an agricultural college. We can not deny that such graduates are entitled to consideration and that men of such training are needed greatly in veterinary medicine. However, it is not easy to select subjects of a professional nature that could be replaced to advantage by agronomy, advanced botany, entomology, floriculture or farm management. The appeals that often come for veterinarians to locate in small country places where their services are needed and where a well-prepared practitioner can easily become the leader of the animal husbandry, suggests the wisdom of at least some compromise with agricultural subjects. Notwithstanding the attractiveness of such a combination, is it wise, when the approved technical subjects of a strictly veterinary nature are more than enough to fill a four-year curriculum, to introduce others? The veterinary schools are confronted with a serious problem—the rebuilding of a curriculum to conform to the rapid progress in the sciences on which the art of veterinary medicine rests.

SUBJECTS OF PRESENT CURRICULA<sup>1</sup>

| FIRST YEAR                 |                       | Subject                  |          |
|----------------------------|-----------------------|--------------------------|----------|
| Subject                    | Colleges <sup>2</sup> | Subject                  | Colleges |
| Anatomy .....              | 11                    | Botany .....             | 3        |
| Animal husbandry .....     | 7                     | Chemistry .....          | 5        |
| Botany .....               | 7                     | Clinics .....            | 3        |
| Chemistry .....            | 11                    | Conformation .....       | 1        |
| Civics and economics ..... | 1                     | Dairy husbandry .....    | 1        |
| Clinics .....              | 2                     | Dentistry .....          | 1        |
| Embryology .....           | 2                     | Economics .....          | 2        |
| English .....              | 5                     | Embryology .....         | 3        |
| Histology .....            | 8                     | English .....            | 3        |
| Hygiene, human .....       | 9                     | Histology .....          | 4        |
| Library .....              | 1                     | Hygiene, human .....     | 6        |
| Military science .....     | 9                     | Materia medica .....     | 5        |
| Pharmacy .....             | 1                     | Medicine .....           | 2        |
| Physics .....              | 2                     | Military science .....   | 9        |
| Physiology .....           | 4                     | Obstetrics .....         | 1        |
| Zoology .....              | 6                     | Parasitology .....       | 2        |
| Zootechnics .....          | 1                     | Pathology, general ..... | 9        |
| SECOND YEAR                |                       | Pharmacy .....           | 6        |
| Anatomy .....              | 11                    | Physical diagnosis ..... | 1        |
| Animal husbandry .....     | 5                     | Physiology .....         | 11       |
| Bacteriology .....         | 10                    | Restraint .....          | 1        |
| Biochemistry .....         | 1                     | Surgery, general .....   | 2        |
|                            |                       | Zoology .....            | 3        |

<sup>1</sup> The subjects included in the curricula of eleven of our oldest State veterinary colleges in the United States and Canada.

<sup>2</sup> The number of colleges in which the subjects are taught.

| THIRD YEAR                  |          | Subject                                      |          |
|-----------------------------|----------|--|----------|
| Subject                     | Colleges | Subject                                      | Colleges |
| Anatomy .....               | 2        | Anatomy, surgical and applied .....          | 1        |
| Animal husbandry .....      | 9        | Animal industry .....                        | 4        |
| Autopsies .....             | 1        | Autopsies .....                              | 3        |
| Bacteriology .....          | 5        | Bacteriology .....                           | 2        |
| Clinics .....               | 8        | Business law .....                           | 1        |
| Consulting clinic .....     | 1        | Canine medicine .....                        | 2        |
| Contagious diseases .....   | 1        | Cattle diseases .....                        | 1        |
| Dairy .....                 | 5        | Clinics .....                                | 9        |
| Diagnosis, laboratory ..... | 1        | Consulting clinic .....                      | 1        |
| Embryology .....            | 1        | Dairy industry .....                         | 2        |
| English .....               | 1        | Diagnosis, clinical .....                    | 1        |
| Horseshoeing .....          | 4        | Diagnosis, laboratory .....                  | 2        |
| Hygiene, human .....        | 1        | Diagnostics .....                            | 3        |
| Hygiene, veterinary .....   | 1        | Dissection, regional .....                   | 1        |
| Infectious diseases .....   | 3        | Entomology .....                             | 1        |
| Jurisprudence .....         | 1        | Horseshoeing .....                           | 4        |
| Lameness .....              | 1        | Hygiene, veterinary .....                    | 3        |
| Materia medica .....        | 4        | Immunity .....                               | 4        |
| Medicine .....              | 10       | Infectious diseases .....                    | 5        |
| Military science .....      | 2        | Jurisprudence .....                          | 6        |
| Modern language .....       | 1        | Lameness .....                               | 1        |
| Obstetrics .....            | 2        | Materia medica .....                         | 1        |
| Ophthalmology .....         | 1        | Meat and dairy inspection .....              | 10       |
| Parasitology .....          | 6        | Medicine .....                               | 10       |
| Pathology, general .....    | 6        | Modern language .....                        | 1        |
| Pathology, special .....    | 6        | Obstetrics .....                             | 8        |
| Pharmacy .....              | 4        | Operative practice .....                     | 3        |
| Physical diagnosis .....    | 6        | Ophthalmology .....                          | 1        |
| Physiology .....            | 1        | Parasitology .....                           | 2        |
| Poisonous plants .....      | 1        | Pathology .....                              | 2        |
| Poultry .....               | 2        | Pharmacology .....                           | 2        |
| Public speaking .....       | 1        | Poultry diseases .....                       | 2        |
| Small-animal clinic .....   | 1        | Practice of medicine and jurisprudence ..... | 1        |
| Small-animal diseases ..... | 4        | Protozoology .....                           | 1        |
| Surgery .....               | 6        | Public speaking .....                        | 2        |
| Surgery, general .....      | 5        | Small-animal clinic .....                    | 1        |
| Surgery, special .....      | 2        | Small-animal diseases .....                  | 1        |
| Surgical exercises .....    | 1        | Surgery, special .....                       | 10       |
| Surgical clinic .....       | 1        | Surgical clinic .....                        | 2        |
| Therapeutics .....          | 3        | Surgical exercises .....                     | 1        |
| Urine analysis .....        | 2        | Therapeutics .....                           | 4        |
| FOURTH YEAR                 |          | Subject                                      |          |
| Subject                     | Colleges | Subject                                      | Colleges |
| Ambulatory clinic .....     | 2        | Veterinary sanitation laws .....             | 2        |

## DISCUSSION

CHAIRMAN PICKENS: The discussion on this paper will be led by Dr. D. S. White, of Columbus, Ohio.

DR. WHITE: The problem of a veterinary curriculum is one that I have been struggling with for nearly thirty years. I do not believe it is as near a solution now as it was then. In the early day things were much simpler, less complex than they are now. The most flourishing college at that time on this continent gave a very brief curriculum of five months, which was repeated, at least in part, the next year for another five months. Compared with present curricula, it would be perhaps considered a failure, but, nevertheless, that institution did turn out some very good men; many of the leaders in our profession are graduates of the old Ontario Veterinary



School. I think the secret of their success was this: They didn't teach much, but what they did teach they taught well.

I think we are attempting to teach entirely too much. Our curriculum is so cluttered up with a great mass of diversified subjects that about all the student can hope to get out of it—the student who sits in class from 8 o'clock in the morning until 5 in the afternoon, with an hour for lunch—is a very bad case of mental indigestion.

I feel, in talking to the most intelligent of our alumni, that what the student wants to get in college, whether it be in a veterinary college or a college of some other type, is something that he can not get outside of college—namely, the fundamental principles underlying, first, the basic subjects which form the foundation of the professional and technical work, and later the fundamental principles underlying the professional side.

We are passing through, I think, what the medical profession passed through. I have been told by credible authority that there are nineteen possible specialties in medicine, and ten years ago every medical school tried to make nineteen different kinds of specialists out of each student. The result is obvious. They have departed from this plan.

I concur fully with Dr. Moore in his suggestion that more agriculture, as he calls it, be included in the curriculum. We made an experiment in Ohio State. We found first that there was a demand coming from young men who had gone into animal husbandry for more veterinary training than we could give them in an agricultural course. We also discovered that the required work in a four years' course in agriculture as given at this university required only two years, the other two years being made up almost entirely of elective subjects. So we induced the agricultural faculty to permit students to elect in those two years entirely veterinary subjects. That made possible a combined curriculum of six years. At the end of the four years the students who have successfully passed through receive a degree of Bachelor of Science in Agriculture. At the end of six years they receive a degree of Doctor of Veterinary Medicine. We surrendered nothing practically in this combination course. How popular it will be I know not, because it has been so recently instituted.

The attempt to standardize these curricula is one that we thought about a good deal. In fact, during the great war an effort was made to standardize them, and a committee was appointed, but nothing came of it. Each college felt that the local conditions governing its organization brought too much pressure to bear to make any great departure from the present organization of the curriculum in the institution concerned, and we must cater to local conditions—there is no doubt about that. I think that the institution which I represent should, in a measure at least, first serve the people of the State of Ohio, who must pay the bill, and we therefore rather resent any outside institution as long as we feel we are serving those people and doing it in a professional and in an ethical way. I presume all other institutions feel very much the same. So, while it might be a laudable ambition to standardize these curricula in the different schools throughout the country, I do not believe you will ever see it fully realized.

CHAIRMAN PICKENS: Dr. Stange, of Iowa, follows in the discussion.

DR. STANGE: I think Dr. Moore covered the ground pretty well. I might mention one or two problems that we have had to deal with out in Iowa. We used to have a great many different subjects in our course; many of these subjects were one and two hour subjects, and I see a good many of them listed on this chart.

We came to the conclusion that everybody who was teaching a subject necessarily would take a certain time for preliminary work—

that is, sort of a basis for the particular subject—and then lead up to the subject matter. We came to the conclusion that inasmuch as our course was becoming crowded, and we were finding insufficient time in four years to cover the material, it would be better to establish fewer courses and make them four and five hour courses if possible. In that way you don't cover the same material possibly two or three times during the time the student is in college. I think we have solved that problem fairly well with subjects that are entirely foreign to any of the other subjects in the course.

The other problem that we had was that we found insufficient time in four years to cover the subjects that are crowding into the course, and we have had to choose between what we consider the more important subjects and the less important ones. We have had to take some subjects from our course which we thought were very valuable courses, but, nevertheless, they were less valuable than some other courses that we wanted to put in, so that we have had to cut down on subjects that Dr. Moore has mentioned, like animal husbandry. We have had to omit some of those courses and replace them with others.

We met the problem very much as Dr. White says they have, by joining with the agricultural people and putting in a six-year course. We have had that course now for several years, and every year we have, I think, some five or six students in the six-year course.

DR. WHITE: I would like to ask of the deans represented here if any of them are on the so-called point system. We have instituted there in Ohio State, beginning this October, the so-called point system. We grade the students A, B, C, and D. A carries four points; B, three; C, two, and D, one. E is a failure. Now a student must receive so many points to graduate. In other words, he may theoretically pass everything, but practically not get through the course. I am afraid that is going to go pretty hard with our fellows, and I just wondered if any of you have had any experience with it.

DR. RICHARDSON: We have had that system. In other words, it is possible for a man to get a grade of D, which represents a grade of 60, and not be able to graduate.

CHAIRMAN PICKENS: We will hear from Dr. Klein.

DR. KLEIN: Dr. Moore has presented very clearly some of the difficulties in connection with the arrangement of a veterinary curriculum. Our past experience has given us reason to think that it is a very difficult matter to arrange a curriculum which will be entirely satisfactory to everyone. Nevertheless it seems to me that there are certain basic principles that could be laid down which might serve as a guide and be carried out in so far as local conditions will permit; because we can not overlook the fact that the arrangement of a veterinary course is very often—in fact, nearly always—governed by local conditions.

We could draw a line of separation through the veterinary course between the second and third years and on the left-hand side we can put all of the basic sciences and the teaching of scientific facts and principles, leaving the other side of the line for teaching the application of those principles. In other words, we put on one side of the line the so-called scientific subjects and then on the other side of the line the so-called practical subjects.

Another thing that Dr. Moore brought up was the time that should be devoted to each subject. That is always going to be, I think, a very difficult point to decide. Usually the most able man in a faculty gets all the time he wants and the other men have to divide what is left as well as they can. I know of only one instance in which a course was carried through or made up just exactly as someone wanted it, and that was during the war. The Educational Department prepared for the War Department a schedule of classes for

a veterinary school, and in this schedule they specified the hours that each subject was to have, and that was turned over to a board consisting partly of veterinary officers and civilians and they had orders to prepare that course for introduction into the veterinary school, and it was so carried out; and if the war had lasted a little longer we would have had a veterinary course in all veterinary schools in exactly the same way. Only under some such conditions will we have such arrangement in effect, and I am not certain that it would be a good arrangement, because it would not permit of the school taking care of local conditions. Some diseases, for instance, or some subjects, which are important in the North are less important in the South, and some which are important in the South are less important in the North.

Now as to how the subjects shall be divided. Dr. Moore mentioned bacteriology. He brought up the point as to whether bacteriology should be divided into different sections. I may be wrong on that point, but my idea is that the bacteriologist should teach bacteriology, just as the anatomist should teach anatomy in general, and then the pathologist should apply the bacteriologist's teaching in special pathology.

DR. WEGNER: It seems to me that the time is right now for veterinarians to begin to specialize. It may be true that the practitioner in the small town does not have need for this specialty, but I do know of a number of veterinarians who would have been very sadly perplexed had they not known where to turn to get some valuable, special information that they needed. The poultry industry in the Northwest at the present time needs some men who are capable of taking care of the health of that industry. I think the demand is now for specialization in veterinary medicine. A year ago at our meeting several men asked me, "Where can we get some special work on sanitation?"

There are positions that we could get if we could go into the city and say to the commissioners, "We are capable of taking hold of your sanitary matters and running your city." If those men could go for a few months and get special training along those particular lines, I am sure they would be glad to do it.

A word regarding the point system. I do not believe that is going to hurt anybody who has the proper qualifications, because we figured it on the basis that the man who gets the grade of the average student is not going to have any trouble with it.

DR. KLEIN: While Dr. Moore's paper has been discussed to some extent, it has not, in my opinion, received the attention it deserves. I hardly think it would be possible in a meeting of this character to give it the necessary consideration. I, therefore, move that a committee be appointed, consisting of one representative of the faculty of each approved veterinary school, to take up the suggestions in this paper, and report, at the next meeting, a plan, if possible, for giving them a thorough study.

(The motion was seconded.)

DR. EICHORN: I believe it is very opportune at this time to give this consideration. I do not know that any section has power to have a committee appointed. I believe it would be advisable, owing to the importance of the subject, to take it up in the general session, and request that a committee be appointed by the President of the Association. That would be a better procedure.

DR. KLEIN: If this section is not permitted to appoint the committee without the approval of the general session, I would suggest that this section vote on this motion, and if it is approved the chairman of the section can take it up in the general session. We can present it to the general session as a proposition approved by the section.

DR. EICHHORN: That is satisfactory.

CHAIRMAN PICKENS: Will you state your motion again?

DR. KLEIN: My motion is that a committee be appointed, consisting of one member from the faculty of each veterinary school approved by the Association, to take up the paper of Dr. Moore and consider the suggestions he made, and report to the next meeting of this Association a plan for carrying out or for making investigation that may be necessary.

DR. DIMOCK: What relationship would there be between this work and that of the Committee on Intelligence and Education?

CHAIRMAN PICKENS: As I understand this motion, it is a case of referring it back to the main body. I should think that would automatically place it with the proper committee.

DR. KLEIN: My motion is for the appointment of a special committee to take these suggestions into consideration, and report the plan for investigating the proposition. I don't think the status of this special committee would place them in a position to inspect veterinary schools and decide whether or not they are complying with the rules of this Association. This is a matter of considering the veterinary curriculum with the idea of bringing about more uniformity in the curricula in the different schools. Whatever recommendation this committee makes would have to be reported to the general session of the Association. Then, if it is proper that it should be referred to the Committee on Intelligence and Education, they will be so informed. I can't see that the appointment of this committee will in any way encroach on the duties of the Committee on Intelligence and Education.

CHAIRMAN PICKENS: The only point I see is that I don't know whether the section has power to appoint a committee or not. Does anybody know?

DR. DIMOCK: It seems to me that all we can do is recommend to the general session. I don't see why we can't recommend that the regular Committee on Intelligence and Education take this up.

DR. KLEIN: The objection to that plan is that in considering any proposition in regard to making the curriculum uniform in the various schools, local conditions have to be taken into consideration, and I have endeavored to provide for consideration of local conditions by having a representative of each teaching staff on this committee. My purpose in suggesting the appointment of this committee at this time is that they will take a general view of the situation and agree upon some plan whereby the committee of investigation, if necessary, may be made. For instance, in the teaching of anatomy this committee might recommend that a committee of anatomists be appointed to consider certain subjects and certain phases in the teaching of that subject. The purpose I have in suggesting the appointment of this committee is that a very general survey should be made by the committee of the conditions existing in the different schools, and then they should report on the possibility of carrying out Dr. Moore's suggestions; and, if it appears possible, those suggestions can be carried out. The best way is to undertake that task.

CHAIRMAN PICKENS: I don't know whether it is in the province of the section to appoint committees or not.

DR. KLEIN: There is no doubt that the section has the right to make the recommendation.

CHAIRMAN PICKENS: Will you amend your motion that we recommend?

DR. KLEIN: I will amend it that we recommend to the general session that a committee be appointed.

DR. MOORE: I think the Committee on Intelligence and Education is going to make a recommendation for the appointment of a committee. I was talking to Dr. Bergman some days ago about the de-

sirability of studying the situation, and he thought it ought to be taken up, and at the time I read my paper he said he was going to recommend the appointment of a committee consisting of two or three men from each college, and those men should be elected or appointed by the college, or by the dean of the faculty of those colleges. Dr. Bergman was not here when the paper was discussed. He told me afterwards the reason he was not here was that he had thought it over and deemed it better to take the recommendation of the Intelligence and Education Committee. I think he has a resolution of recommendation.

DR. KLEIN: In that case, I will withdraw my motion if that has been taken care of.

CHAIRMAN PICKENS: With the permission of the second, we will withdraw the motion.

(Consent of the second was given, and the motion was withdrawn.)

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### MARKED CHANGES IN BEEF PRODUCTION

Beef production in the United States has undergone marked changes since 1850, and chief among them is the difference in age to which animals destined for slaughter are kept on the farms.

With a larger proportion of beef cows kept, and with cattle slaughtered at an earlier age, it is now possible to raise more beef each year than when there were more cattle in the country than at present. However, the system of using younger cattle for beef involves the use of more harvested feed per 100 pounds of beef produced, since a larger proportion of the gains in weight are made in the feed lot than was formerly the case when steers were carried four or five seasons on grass.

While the total number of cattle in the country has decreased in recent years, the situation is not as serious as might appear, since the number of cattle is greater now than any year from 1896 to 1917.

That the country can readily respond to a quickened demand for beef was demonstrated during the war when production was so stimulated that during 1917 and 1918 combined more than 1,000,000,000 pounds of beef were exported, which was 7 per cent of our production and 22 per cent of the exports of the world during that period. Since about 1905 South America and Australia have been the chief sources of surplus beef.

Americans are eating less beef per capita than formerly, but the figures show that when demand and prices provide sufficient stimulus the supply can be increased at a surprisingly rapid rate.



## SEQUELÆ OF CANINE DISTEMPER<sup>1</sup>

By WILLIAM E. MULDOON

*Professor of Comparative Medicine, Kansas State Agricultural  
College, Manhattan, Kansas*

DISTEMPER may be defined as an acute, contagious, infectious disease of young canines, which is characterized by febrile manifestations and an acute catarrh of the mucous membrane. This condition is frequently followed by numerous pathological changes, either temporary or permanent, in various tissues of the animal's body. As we are particularly concerned with the sequelæ of this disease, it is advisable to discuss the subject in a more or less systematic way and endeavor to emphasize the more important forms of distemper and the complications which may follow each form.

In regard to the symptoms of the disease as a whole it may be said that the first thing noted is usually a fever of from 103 to 104 degrees. This is accompanied by prostration, dullness, impaired appetite, erection of the hair along the spine, shivering, trembling, seeking a warm place, fatigue on slight exertion, hot, dry nose, and burning pads of the feet. Later the temperature may descend to normal, or there may be alternations of rise and fall. One of the most characteristic symptoms of distemper is the implication of more than one set of organs, so that morbid manifestations referable to the nose, eyes, throat, stomach, skin and nervous system, and occurring in the same subject, are to be especially noted. In enumerating the prominent symptoms caused by disease of one set of organs, therefore, it is not implied that the absence of others referring to a different class of organs is to be understood. On the contrary, a complication of several is especially significant of the disease, though the predominance in one class of organs will signify a special form of the disease.

### RESPIRATORY SYMPTOMS

One of the earliest symptoms is usually sneezing with a redness of the nasal mucosa, followed by a mucopurulent blocking

<sup>1</sup> Presented at the fifty-ninth annual meeting of the American Veterinary Medical Association, St. Louis, Mo., August 28 to September 1, 1922.

of the nose, and rubbing of it with the paws. With the implication of the throat there is usually local tenderness and a hard, painful cough, which may be accompanied by retching or vomiting. The breathing becomes snuffling, especially in the short-nosed dogs, and rapid and even oppressed in case of implication of the smaller bronchi and the lungs. The nostrils may become glued together, the discharge red or dark colored. Vesicles and sores may appear on the mucosa, and the cough may get paroxysmal, small, weak, husky or gurgling.

Percussion of the lungs may reveal small areas of flatness from exudate or collapse, and in the case of pleurisy and hydrothorax there is lack of resonance up to a given horizontal line, varying in position according to the position of the animal and always keeping to that part of the thorax which may at the time be lowest. Auscultation will reveal various sounds, according to existing lesions. There may be a loud, blowing murmur over the large bronchi, or at points to which this sound is conveyed through consolidated lung. Or a course of finer mucous rales may be present, indicating the second stage of bronchitis; or a line of crepitation around a nonresonant area, indicating pneumonia; or there may be friction sounds, or later, creaking murmurs from false membranes. Wheezing sounds are not uncommon, also sounds of the heart, bronchi or bowels, heard in unwonted situations to which they are conveyed through consolidated lung tissue. Dyspnea may become extreme, with puffing out of the cheeks, labial souffle, and violent inspiratory action. Emaciation, sunken, pale or dark red eyes, putrid diarrhea and nervous disorders usually precede death.

Regarding the animals which recover from this type of distemper nothing need be said, but we are at times confronted with various chronic sequelæ which often cause the small-animal practitioner a great deal of worry. Under this head we may mention the following:

1. *Chronic Nasal Catarrh*.—This is usually shown by a purulent discharge, varying in quantity, from both nasal passages. This discharge in severe cases is streaked with blood and has a very offensive odor; it causes excoriations on the mucous membrane and skin at the nasal openings, where it forms dry and hard crusts. There are frequent paroxysms of sneezing. In

cases where the nasal passages are occluded the animal breathes through its mouth.

In handling this condition the best results will probably be obtained by keeping the animal in a warm place and spraying the nasal passages daily with a solution of creolin 2 per cent, boric acid 2 per cent, or sodium bicarbonate 2 per cent. The dried crusts should be removed with warm water, and zinc oxid ointment applied to the membranes and skin at the nasal openings. If this treatment fails, cultures may be grown from the nasal discharge and a standardized autogenic vaccine made. Two cubic centimeters of this vaccine should be injected subcutaneously every five to seven days until the purulent discharge ceases.

2. *Chronic Catarrh of the Larynx*.—The symptoms of this condition are similar to those of acute laryngitis except that they are not so severe. The cough sounds dry, hoarse, rough—sometimes moist—and it is frequent, quite loud, and accompanied by a wheezy inspiratory sound, and in rare instances with retching or even emesis. In some cases the cough resembles the whooping cough of children. It is heard mostly at night, or when the animal runs and plays as he would do before being taken out for a run.

As a rule the treatment of this disease is unsatisfactory, but it depends to a large extent on the condition of the animal. Various cough mixtures may be prescribed to allay the irritation and lessen the coughing. Inhalations of medicinal agents, such as turpentine, etc., may be of value. The best method is to put the animal on a cane-seated chair, and having placed the medicated agent, steaming hot, underneath the chair, to cover the dog with a sheet and by holding him compel him to inhale the vapors for ten or fifteen minutes. Direct applications of silver nitrate 1 to 100 may be used in some of the more obstinate cases. In making these applications to the larynx an assistant holds the mouth open with tapes, the tongue is pressed down with a spatula or the handle of a spoon, and the throat is sprayed by means of an atomizer.

3. *Chronic Interstitial Pneumonia*.—This is a frequent sequel to the respiratory form of dog distemper, as in the course of this condition resolution does not take place and the fibrinous

exudate collected in the alveoli during the stage of red hepatization is displaced by a fibrous tissue. The symptoms usually shown are a moderate dyspnea and a chronic cough, with a nasal discharge which may be slight or profuse. The exhaled air has a fetid odor, due perhaps to some smaller abscess formation. The temperature is usually normal and often no marked symptoms are noticed. In some cases dropsical effusions are present, and the animal may suddenly die if compelled to exert itself.

The prognosis of this condition is bad and the disease is usually considered incurable. However, one may prescribe expectorants and use general stimulants to modify the symptoms, and a thorough course of potassium iodid may prove of value.

4. *Pleurisy with Effusion.*—We are not particularly concerned with primary pleurisy, except where there is an effusion present in the chest cavity. When the effusion present is in large quantities, excites much dyspnea, becomes purulent or remains unabsorbed after from ten to twenty days, proper treatment should be undertaken. Diuretics and cardiac stimulants have only an indirect influence on the accumulations, and when the exudate is gradually absorbed one can hardly credit these drugs with accomplishing the results, as the exudate is usually reabsorbed when the acute inflammatory stage of the disease has passed.

The best method of treatment is the removal of the fluid by surgical means; that is, by puncturing the chest wall. This is best performed by means of a thoroughly sterilized trocar and cannula or aspirating needle. It is best done with the animal either in a sitting or a standing position. Remove the hair from and disinfect a small area on the side of the chest so that the instrument may be inserted in a forward direction at the anterior border of the sixth, seventh and eighth ribs, and as low in the cavity as possible. The amount of fluid that may be removed depends on the heart action. When the heart becomes weak and rapid or when coughing suddenly develops, the operation should be discontinued. If necessary the chest may be tapped daily at a different site of puncture until all fluid is removed.

#### EAR SYMPTOMS

Inflammation of the external auditory meatus with the formation of vesicles and discharge is a common lesion (50 per cent).

It is marked by pain and tenderness, which usually disappear during convalescence. In some cases a chronic catarrhal condition of the canal is left which requires constant care for some time in order to perfect a cure. In such cases the ear should be carefully cleansed with pledgets of cotton saturated with ether. The canal should be made dry with clean gauze or cotton and a drying antiseptic powder introduced carefully into the ear as far as possible. If there are ulcerations present in the meatus it is advisable to anesthetize the canal first by dropping a 4 per cent solution of cocain into the canal and then touching up the ulcerated areas with stick nitrate of silver or by instilling a 5 per cent solution of the silver nitrate into the ear. Should the animal shake the head continuously, or in any way hinder the treatment, a head cap should be employed for a few days.

Deafness may follow distemper in dogs. It is probably due to a paralysis of the auditory nerve. Treatment is usually of little value, although good results may be obtained in some cases by building up the animal's strength and administering fairly good-sized doses of strychnin sulphate, according to the animal's size, over quite a period of time.

#### EYE SYMPTOMS

Conjunctival congestion is one of the earliest and most constant symptoms. Weeping, swollen eyelids and reddened mucosa are seen. Photophobia may bespeak keratitis. Soon the watery tears become mucopurulent, matting together the lashes and even the lids, especially during the night, so that they must be sponged to get them apart in the morning. Vesicles exceptionally appear on the conjunctiva; more frequently it becomes cloudy and opaque, and at points near the center degeneration of the epithelium leads to the formation of ulcers, no larger than pinheads but extending into the cornea and sometimes perforating it so as to allow protrusion of the membrane of Descemet or the escape of the aqueous humor. The formation and extension of the ulcers are favored by the animal's general debility, by rubbing of the eyes with the paws, and by the infection of abrasions with pus organisms. This infection may extend to the lining membrane of the anterior chamber, and even of the posterior, with panophthalmia, but in the absence



of perforation internal ophthalmia is rare. When the ulcers heal, white cicatricial spots, or black points caused by the adhesion of the uveal pigment, remain.

*Chronic conjunctivitis* frequently follows distemper and often persists a long time. The conjunctiva is somewhat thickened, and the secretion is scanty and of a mucoid character, and is deposited at the angle of the lids. In some cases there is little or no secretion and the membrane is reddened or dry. When this is the case increased winking occurs in order to moisten the cornea. The secretion upon the edges of the lids may produce an inflammation and cause the lashes to fall out; it gives the whole eye a heavy, drowsy appearance. When the condition has been severe, eutropion or inversion of the lid often occurs, and in a large number of cases this is the real cause of the eye trouble persisting.

The uncomplicated chronic conjunctivitis may be treated by means of astringents such as zinc sulphate or copper sulphate in from 0.5 to 1 per cent solutions. If crusts form about the margins of the lids, apply yellow oxid of mercury ointment every night and wash it off next morning with a solution of bicarbonate of soda. This will soften the crusts, prevent the lids from sticking together, and allow the secretion to flow out more freely.

If an inversion of the lids is present surgical treatment is necessary in order to afford permanent relief. An elliptical piece of skin is removed from the eyelid parallel to the margin and about one-eighth to one-quarter inch from the edge of the lid, and the skin sutured so that the lid will be drawn out or everted. A certain amount of judgment is necessary to determine the amount of skin to remove in each case. After the operation the wound is covered with a flexible collodion dressing and the sutures removed in three or four days. Care should be taken to avoid injury to the deeper structures or to the margins of the lids when operating.

*Opacities of the Cornea.*—These are the result of an inflammation of the cornea, following dog distemper, and may be designated according to their density as (a) nebula, a slight turbidity; (b) macula, a denser opacity easily seen in ordinary light; (c) albugo, a translucent opacity; (d) leukoma, the entire cornea becoming turbid or milk white. The prognosis depends upon the age of the patient and the duration, location, extent and character of the opacity. The more recent the

opacity the more favorable the prognosis. As most of these opacities are composed of cicatricial tissue, complete removal of them is very difficult. Dionin is the drug which will probably give the best results when applied either in solution (5 to 10 per cent) or in the powdered form. It is advisable to begin with a few drops of a 5 per cent solution instilled into the eye several times daily, and increase the strength of the preparation later if necessary. The powdered form may be dropped into the eye daily for about a week, and a week or ten days allowed to elapse before the treatment is repeated. A severe reaction usually follows the first treatments but this disappears after about a week. Yellow oxid of mercury ointment has also been used with good results, as well as silver nitrate solution in 4 per cent strength. To obtain results any treatment must be continued for a long time, and the prognosis in these cases should always be guarded.

#### DIGESTIVE AND HEPATIC SYMPTOMS

Anorexia and vomiting may usher in the disease. Buccal congestion, dryness, clamminess and fetor are marked symptoms and there may be some yellowness of the mouth and eye. The patient may at first be constipated, but diarrhea often sets in early, with tenesmus, much fetor, mucous froth and even blood, also abdominal pain and tenderness. The abdomen is habitually tense and contracted. Ulceration of the mouth, gums and rectum, invagination, prolapsus ani, jaundice, septic pneumonia, paralysis, and convulsions or cutaneous eruptions are occasional complications. The abdominal type of distemper is especially fatal. In its early stages debility, prostration and drowsiness are marked features.

We need not say much concerning the after effects of dog distemper upon the digestive tract, as the condition usually rights itself as the animal returns to normal. In some cases there may be a persistent gastritis or gastroenteritis which may remain for some time, but if the patient is properly fed and cared for this usually disappears. In case it should not, we can only recommend the regular outlined treatment which is used in these conditions when due to some other cause. It is quite probable that the continuous administration of more or less irritant drugs over a period of weeks in the treatment of the primary disease is the cause of this condition.

## CUTANEOUS SYMPTOMS

In a great number of cases skin eruptions are observed at some stage of the disease, and may remain as a sequel for a time after apparent recovery. In some cases the only prominent symptoms are a high fever and skin eruption, and in these cases recovery may be looked for with some confidence. The lesions are most prevalent on white-skinned dogs with short hair, and on the most delicate parts of the skin (abdomen, serotum, perineum, inside of the thighs and elbows), but they may extend over the whole body and even enroach upon the mucosa. They vary much in different cases and stages. There may be punctiform reddish spots, changing to hard elevated papules, and in some cases to vesicles and even pustules. The vesicles may be small and pointed, but more commonly they are rounded and flat and as large as a lentil or a small pea. When first formed they contain liquid exudate which may be clear and transparent, but is often reddish or even violet. The individual vesicles tend to burst and dry up, but others appear, and thus the eruption will continue for weeks, the skin meanwhile exuding a sticky, greasy, offensive-smelling exudate which mats the hairs together. Itching is usually slight, yet in given cases excoriations are produced with considerable moist discharge. These skin lesions tend to spontaneous recovery when the general health improves, and appear to be little affected by treatment.

## NERVOUS SYMPTOMS

Nervous symptoms are shown more or less from the beginning. The great dullness, depression, apathy and weakness which usually usher in the disease are indications of a deranged nervous system. Drowsiness may be shown early. Even the early nausea and vomiting may be largely central in its origin. The dog is restless and irritable, getting up and moving from place to place, starting from sleep, yelping, snapping, with twitching of the muscles of the face or limbs, rolling of the eyes, and excessive heat of the head. Epileptic attacks may appear at any stage of the disease. Tonic spasms, paresis and paralysis are usually late manifestations and often seem to be sequelæ determined by toxin poisoning of the nerve centers, or by degeneration of their structures. Twitching movements may be confined to the head, or to a limb, or they may affect the whole body. Tonic spasms often affect the neck, turning the head rigidly to one side.

The proper handling of these nervous affections following canine distemper is one of the most difficult problems that confront the small-animal practitioner. We are sorry that we have nothing specific in the way of treatment to offer, and we can only say that treatment must correspond to the morbid phenomena. Extreme prostration may demand diffusible stimulants—ether, camphorated oil, or strychnin sulphate. Spasms and other indications of congestion may be met by cold to the head and inhalations of ether, followed by rectal injections of chloral hydrate. Posterior paralysis may be treated with tonics, stomachics, easily digestible rich food, and good hygiene. Massage, rubs and the application of electricity may be indicated, and of value in this condition. A light firing along the back and lumbar region may be of some service; at any rate we have seen a few cases recover where it has been employed.

The nervous twitching so common after distemper is not, in our opinion, a true chorea, as it is so often called, but a form of disseminating myelitis. In the majority of these cases there are more or less rhythmic contractions which generally involve the muscles of the extremities, but more rarely may affect the muscles of the neck or the abdominal muscles exclusively. The muscles of the chest and the muscles supplied by the radial and sciatic nerves are the ones chiefly involved. In the majority of cases there is a nuclear paralysis, and sometimes also a supranuclear paraplegia of certain groups of muscles of the extremities and of the sphincters. Automutilation sometimes occurs in this condition.

It has been our experience that it is absolutely useless to expect results from the administration of nerve stimulants such as strychnin, veratrin, arsenic, etc. Neither can results be expected from the full-sized doses of potassium iodid which are used by some as a routine treatment. If muscular atrophy should threaten or should be actually present, attempts should be made to check it by passive movements of the paralyzed limbs and by massage. Some authors record rapid improvements following the subcutaneous injection of eserine, pilocarpin or arecolin, but the writer doubts their value in this condition. Recently we have been experimenting with the administration of thyroid extract in these cases, but as yet our results are not worth publishing. The prognosis of these cases is always to be guarded,

and we believe that we can expect results only in the case of young animals that will receive good care over a long period of time, and thus perhaps outgrow the condition.

#### LESS COMMON SEQUELÆ

Some other sequelæ may follow canine distemper but are less frequently met.

*Amaurosis*.—This is really a symptom and not a disease, and the condition so-called which we see following distemper results in blindness without a visible lesion of the eye. It is probably due to some disturbance of the optic nerve. The principle symptoms are blindness and an abnormal dilatation of the pupil which does not react to light. In the early stages the eye appears normal, but later the globe becomes atrophied. Treatment is usually of no avail, but in some cases as the animal recovers from the primary disease the eye returns to normal.

*Lymphangitis*.—We have observed several cases of distemper during the course of which one or more of the legs became hot, painful and swollen. On examination the subcutaneous lymphatics were found to be enlarged and to present a peculiar corded appearance. In a few cases there was a rapid recovery, but in some an abscess was formed with an accompanying diffuse phlegmon. The therapeutic treatment of these cases consists first in the application of a cooling pack, and later, if the glands show any indication of abscess formation, in opening them by surgical methods.

#### DISCUSSION

CHAIRMAN FLYNN: We have just listened to a paper on one of the important subjects of small-animal practice. No one enters into the practice of veterinary medicine for any great length of time without coming in contact with canine distemper and its after effects. This subject is open for discussion.

DR. C. A. CARY (Auburn, Ala.): In the South this last year, the last six or eight weeks, we have had a peculiar excess, we might call it, of distemper in dogs, involving not only young dogs but old dogs. Among hounds where there are fifteen or twenty in the bunch it is not unlikely that all of them will have the epileptic type following distemper, probably. We have had that in numerous cases this year. In thirty years of experience in the South I have never known it to occur before. This year it has covered several States in the South to my knowledge. It is very intractable. The only cases I have seen recover are those that are a little old. The more you monkey with these cases the worse they get. I don't want to knock our profession in any sense of the word, but we are just up against it. I don't know how it is in the North, but if you have it and have means of controlling it or curing it, I would like to hear about it.

The practitioners of the extreme South are troubled very seriously



with this problem. I don't know about the Middle States. Invariably the owner of the dogs says, "Our dogs have fits." When we go to look at them we nearly always find this type of epileptic sequela. We have tried dieting; we have tried a good many of the so-called remedies for nervous trouble. We have tried sedatives and narcotics and things of that kind, and we can handle this temporarily. We have tried to get rid of the worms they say produce convulsions, but it doesn't do any good in these cases. I know that most practitioners are up against it when they encounter distemper.

I remember when I was in Francker's clinic in Berlin; Francker's great drug was calomel. We got over that and found out that calomel probably is a good purgative, in a sense, in certain stages, to eliminate what we might term bile and things of that kind; but calomel doesn't do any good in a lot of cases. I might enumerate a good many things, bacterins and others things, but I am not going to do that. I am after this one thing: Can you give me any light on these cases of epilepsy? Can you give me any help?

CHAIRMAN FLYNN: Can anybody offer any suggestions to Dr. Cary's question?

DR. FRICK: The problem of canine distemper, as we know, is the biggest problem that the small-animal practitioner has to contend with, and there are a few points I want to call attention to. One fact is that this is very similar to influenza in humans; in certain years the virulence will greatly increase and everything dies, and the next year we think we have a cure for it, and with almost anything you use the majority of them will live. I wonder if it wouldn't be a good plan if there could be some committee arranged by the small-animal practitioners to spend a definite amount of time in investigating the question of distemper, similar to the committees on tuberculosis and abortion, etc., on large-animal work.

DR. C. VANDERWARF (Chicago Heights, Ill.): I happen to have quite a bit of experience with distemper in dogs. I meet with it every day. I have tried everything, I suppose, that nearly everybody here has. I am up against it. In the past few days I have lost a couple of dogs, which was very much of a disappointment. They were a couple of bloodhounds that a fellow thought a lot of. There was a banker in our town who bought a Belgian Police dog and it died with distemper. He bought another one and told me he was going to have me immunize it. I tried to immunize it with serums, and it died with distemper. He got another one and treated it a while himself, and it died with distemper. I am up against it just the same as a lot of the rest of you.

I have a dog of my own that just plays around this stuff and it doesn't bother him one bit. I don't hold him back. When a case of distemper comes on the place I let him run. He is always loose and all over the place. That dog surely must be immune. I have had other dogs on the place that weren't any good. I let that dog with patients that are probably around, and I have had bad ones on the place that would refuse food and the discharge would be all over the food, and I fed it to this dog and couldn't make the dog diseased at all. I am not situated so as to have a laboratory, but I have just been wondering lately whether any of you have ever tried the serum of an immune dog or hyperimmune dog. I wonder if that is possible, the same as you would get serum from a hyperimmune hog. I wonder if this would be possible in the dog. I would like to hear from any of you who have tried it or had experience.

DR. MILKS: What kind of a dog is it?

DR. VANDERWARF: It is an English bull, not purebred.

DR. MILKS: It is very hard to produce distemper in a dog. There is some controversy as to the cause. We have tried the immune serum, and our dog died just the same.

DR. F. O. WALTERS (Lemont, Ill.): I have had a great deal of experience with distemper. It seems that within the last four or five years we are having more trouble than we used to have. There was a time when you could immunize a dog against distemper and make it hold, but that can't be done. It seems there is a complication present with distemper which the scientists or laboratory men haven't worked out. They say that we don't get any results from the treatment we are using at present. It seems we have more trouble in the highly bred animals. The dog fancier is trying to get a higher class dog, and I think with this high breeding and inbreeding they reduce resistance and of course the dog is more subject to these conditions. Dr. Vanderwarf spoke about his bulldog not contracting distemper. You have better success with these curs than you have with the better bred animals. (Laughter.)

DR. QUITMAN: I just want to answer a question. The paper is almost too long to take up the various points for discussion, but there has lately been going around—I dare say most of you have heard of it—the recommendation of using hog-cholera serum in the treatment of canine distemper. I just want to ask if there is anyone here who has used it, and what your experience has been. I have heard three or four, may be half a dozen, reports, and they have been extremely favorable. On the other hand, my own experience with it, which was only one case, pointed out a great danger. The one gentleman to whom I spoke at this meeting about it had tried it and he also had unfavorable results from it. That treatment does not appeal to me for this reason: Although I am of the opinion, and have been for many years, that canine distemper is due to a virus the same as hog cholera is, I feared when I heard the suggestions made, or had the reports of the value of hog-cholera serums, the danger of anaphylaxis. Of course I know anaphylaxis usually comes with the second or third dose, nearly always the second dose. The second dose brings the patient down with anaphylaxis. The case of which I speak was an absolutely hopeless case, but this pup shouldn't have died for a matter of four, five or six days. However, after receiving a dose of concentrated hog-cholera serum, he died in about 15 or 25 minutes. I was discussing with Dr. Eichhorn whether this could have been anaphylactic reaction. At first he said he didn't think it was, but when I called his attention and asked him if he didn't think canine distemper would do, he agreed in his opinion that it was. Then, discussing the thing, he finally came to the conclusion that it probably was anaphylactic reaction because of the death of the puppy in 20 or 25 minutes where it should have taken four, five or six days to die.

I would like to hear if any of you have given this hog-cholera serum treatment in canine distemper. It is my opinion that when these gentlemen report good results from it, it is a case of erroneous diagnosis, because some veterinarians call every case a case of distemper if a dog has a discharge from the nose or eyes. During the last three or four months I have had a great run of ordinary cases of coryza and rhinitis in the dog. But I know it has become a practice if the dog shows any nasal or eye discharge to call it distemper. All such cases, however, are not distemper. It is probably those cases, not true distemper, that hog-cholera serum acts upon. I think, after our information on the subject, if any of you have used hog-cholera serum either favorably or unfavorably you should make a report now.

DR. VANDERWARF: I have tried everything. I have tried clear serum on the two particular bloodhounds I was speaking about, and both of them died the same way that Dr. Quitman spoke of. With ordinary treatment I couldn't see why they wouldn't have lived for about a week or ten days or probably a month, but instead of that the one came back for the second treatment and the other never came

back at all. I used this subcutaneously. They were fair-sized dogs. I gave about 18 c.c. If any of you contemplate using it, I would say be a little bit careful about the stuff.

DR. CAHILL: Dr. Quitman has brought up one or two points which seem to me to be rather important. Thinking back a few years, I think you all remember the time when one or possibly two biological producers in this country collected practically all of the serums of different kinds and simply relabeled them and sent them out as canine serum. You older men all recall that was a prevalent custom a few years ago. The Bureau of Animal Industry forced several people to discontinue that move, and apparently no more dogs died of distemper since then than before. It seems quite difficult to see a reason why we should get a nonspecific action from hog-cholera serum in a case of canine distemper. Nonspecific therapy has been used in some diseases with apparently good results until properly investigated and experimented, and then it has proven to be more or less imaginary. I am sure the same thing will happen if anti-hog-cholera serum should be used to any extent in canine distemper.

Dr. Quitman's remarks about a case of anaphylaxis makes me think of a similar case which was called to my attention last year. From what information I have, it seems that anaphylaxis in dogs is particularly prevalent in Chicago following the use of immune serum. One large practitioner there whom I know had four or five dogs die in this manner after using canine anti-distemper serum. It was suggested to him at the time that there existed the possibility of these pups having been treated by some other veterinarian or the owner himself, and the owner not conveying the knowledge to this veterinarian when the dog was admitted to the hospital. He acted on the suggestion and endeavored to trace the matter down, and he found out that of the five dogs that died from anaphylaxis he could definitely ascertain those pups had more than eight days previously received a dose of anti-canine-distemper serum from another veterinarian. There isn't any more reason why we would get anaphylaxis in the case of anti-hog-cholera serum given to dogs than in the case of anti-distemper serum, both of which are foreign proteins. In this particular case the veterinarian who was experiencing the difficulty overcame it by sensitizing his dogs first. I might say he has completely eliminated for several months cases of anaphylaxis by giving a very small sensitizing dose subcutaneously. I have been informed by him within the past few weeks that he hasn't had a case of anaphylaxis within four months, whereas he was getting one every few days previous to that.

DR. EICHORN: Instead of sensitizing the dog, it should be desensitized. I just want to convey the impression that we want to desensitize the animal and then sensitize him.

With regard to the use of anti-hog-cholera serum for the prevention of canine distemper I am very much of the opinion of Dr. Cahill, that up to date nothing would justify us in employing such a serum in this disease.

There is no question but what we do not know at this time the actual cause of canine distemper. I believe that the information which I received during the recent trip to Europe from the original investigators of canine distemper in Alfort, that canine distemper in their belief represents a group of diseases and not a single disease, is correct. When they designate canine distemper in the French language, they call it diseases of young dogs. So we might have to deal with diseases of young animals with different etiological factors. That is the result of the findings. Probably in the majority of cases we have to deal with the virus which is the original cause of the disease. Some of the veterinarians report unfavorable results from the use of canine distemper products as marketed today, and others report favorable results.

## DISEASES OF THE CORNEA<sup>1</sup>

By H. J. MILKS

*New York State Veterinary College,  
Cornell University,  
Ithaca, N. Y.*

THE TREATMENT of diseases of the eye forms a considerable part of a small-animal practice. Unlike similar work on medicine, there is no call for refractive work and consequently most cases mean the treatment of inflammatory conditions. No one line of treatment will do for all kinds of trouble or for the same disease in different animals, although with an understanding of what must be done and some knowledge of the use of different remedial agents much can be accomplished.

Probably no disease with which we come into contact and for which considerable can be done is met more frequently than keratitis in some of its forms. It is more common in dogs than in cats, and certain pop-eyed dogs, such as Bostons, "Pekes," etc., appear predisposed to it.

### EXAMINATION

Normally the cornea is lustrous and transparent and the epithelium covering it forms as good a reflecting surface as the best mirror. There are no inflammations of the cornea in which these characters are not changed. The usual symptoms of inflammation are lacking in keratitis because there are no blood-vessels and the organ is not elastic. The most prominent diagnostic symptom is cloudiness, due to a collection of leucocytes that have passed in from adjacent vessels. If the cornea in such a case is examined with a hand lens its surface will appear roughened or uneven as though punctured with needles (stippled), and there is no corneal infiltration in which there is not this stippled appearance of the epithelium. This condition is sometimes seen in old scars, but they are distinguished by their color. Scar tissue is bluish or white, while the infiltration always has a yellowish tinge.

Congestion of the blood-vessels, conjunctival and ciliary, usually accompanies inflammation of the cornea, but may be absent

<sup>1</sup> Presented at the fifty-ninth annual meeting of the American Veterinary Medical Association, St. Louis, Mo., August 28 to September 1, 1922.

in mild cases and occasionally in severe ones. Iritis and hypopyon are frequent complications.

After a diagnosis of keratitis has been made, it is necessary to know where the disease is located—that is, whether superficial or deep. This is not easily determined from direct examination, but there are certain signs that can be used as an aid in the determination. As a rule superficial inflammations are more or less sharply defined, the deep ones less so, and have the appearance of hazy spots of irregular form. Corneal vessels also play an important rôle in the diagnosis. The superficial vessels are arborescent, tortuous, bright red, easily seen, and can be traced to their origin in the conjunctiva. The deeper ones come from the sclera and extend into the cornea in straight red lines. They are less distinctly seen because they are often covered by a densely infiltrated corneal layer. In general, superficial vessels indicate superficial and deep ones parenchymatous inflammations, but the presence of superficial vessels is not absolute evidence against deep inflammations, as in some cases the superficial accompany the deep. Deep keratitis is usually due to general infection, as in distemper.

Several distinct types of keratitis are described and the disease is often divided into well-defined groups, but for practical purposes it may be divided into nonsuppurative and suppurative or ulcerous keratitis. Nonsuppurative may be again divided into superficial, deep or parenchymatous, and vascular or pannus.

#### NONSUPPURATIVE KERATITIS

*Superficial keratitis* is an inflammation of the epithelial covering of the cornea and the superficial layers of the parenchyma. It is shown by a bluish white cloudiness which may be localized or diffuse and is accompanied by lacrimation and photophobia. Resorption usually takes place in a few days. Occasionally a slight desquamation takes place, but this is so superficial as to need special attention to recognize it, although it may easily be outlined with a drop of fluorescein solution.

*Keratitis punctata superficialis* or *faceted keratitis* is often seen in certain breeds of dogs, especially the Pekingese. It is characterized by more or less generalized cloudiness in the midst of which small areas may be distinguished by careful examination. These spots are opaque, white, gray, or even yellowish, forming a slight relief in the cornea and penetrating somewhat.



Sometimes they ulcerate. Between these are portions of mirror-like tissue which gives a faceted appearance. This tissue may erroneously be diagnosed as ulcerous but is in reality sound tissue. The affection may affect both eyes and, according to Nicholas, should be regarded as chronic. The attacks are recurrent or tend to be periodic, the symptoms changing somewhat but not disappearing entirely in the periods between the attacks.

*Treatment.*—The routine treatment of nonsuppurative keratitis consists in the use of warm, nonirritating antiseptic solutions. According to Gray, the milder the better. Heroic measures are not indicated in superficial keratitis and their employment leads to disaster. The use of hot packs, two or three times daily, and instillation of such agents as 2-4 per cent solution of boric acid, 1 per cent borax, 1-5,000 bichlorid, chinisol, etc., usually effect a cure. A 1 per cent solution of atropin is useful in severe cases, both to relieve pain and lessen liability to iritis. Pain and photophobia may be relieved by a 1 or 2 per cent solution of cocain, but the continuous use of this agent is believed by many to be detrimental. Quinin and urea hydrochlorid appears to work well in these cases. It does not produce its action so rapidly as cocain, but lasts for a long time, up to 24 hours or more. After the acute symptoms have subsided calomel or iodoform in fine powder or in ointment may be useful, or the cornea may be massaged with a weak (1 or 2 per cent) yellow oxid of mercury ointment. Dionin is frequently useful and may be employed in pure form dusted upon the cornea or in 5 to 10 per cent solution or ointment. This drug produces edema of the conjunctiva and is thought to promote the flow of lymph through the cornea and in this way aid in the absorption of the exudate. It is also useful in deep-seated pain. The eye soon acquires a tolerance for this drug, hence little will be accomplished from its use for more than a week or ten days. This tolerance soon wears off and the drug may be employed again after a few days' intermission.

*Pannus* is a vascular growth of connective tissue upon the superficial layers of the cornea, but may be between the corneal epithelium and Bowman's capsule. It begins with keratitis in which areas become clouded and infiltrated with superficial tortuous vessels, largest at the periphery and directed toward the center. If the cause has disappeared, the new tissue be-

comes organized and takes on a cicatricial appearance, the vessels becoming fewer in number. This disease is not a common one but is occasionally seen in dogs.

*Prognosis* depends upon the corneal infiltration and destruction of the epithelium. It is frequently followed by opacities, but treatment will often restore an eye to a fairly serviceable condition.

*Treatment* consists in massaging with a yellow oxid of mercury ointment and the use of astringents. The application of dionin seems to be of considerable benefit. If very vascular, periotomy sometimes works well, but according to Gray it is not usually successful. If there is much cicatricial tissue it may be removed with a knife or currette, following this with massage with yellow oxid of mercury ointment and the application of dionin.

#### SUPPURATIVE OR ULCERATIVE KERATITIS

*Ulcerative keratitis* is a common disease of dogs. It may be primary, in which case it begins in the cornea from abscesses, wounds, or secondary from conjunctivitis. It may also be classified as endogenous, due to infections through the blood and lymph, or exogenous when due to local influences; but of whatever nature they lead to the same thing and ulceration is the result. In some cases the ulcers follow a diffuse keratitis and in others remain localized and appear as though a small amount of tissue had been gouged out of the cornea. After the ulcer has formed it may be progressive, if it is still active, or regressive, if there is a tendency to cicatrize. In this stage it is also known as a clean ulcer. The healing process is accompanied by the development in the cornea of long, flexuous, red vessels, reaching from the ulcer to the sclerocorneal limbus. Cicatrization always takes place by means of opaque tissue on a level with the corneal struma. The epithelial layer is entirely regenerated by proliferation of its margins and in the end completely covers the newly formed tissue. If entirely filled up, the cicatrix is on a level with the rest of the cornea and can be recognized by its opacity and irregular surface, but if not completely filled, a flat faceted place remains. In some cases the scar tissue does not withstand the intraocular pressure and bulges forward from the rest of the cornea—"ectasic cicatrix."

As the ulcer progresses it may extend into the depths of

the cornea, destroy its whole thickness and leave only Decemet's membrane. This may resist but more often yields, and we get a hernia of the membrane or a keratocele. As a rule, however, this membrane breaks under the intraocular pressure with consequences which will be discussed later. As long as any of the corneal layers remain, the floor of the ulcer will be opaque, but when only the membrane of Decemet is left the edges will be opaque but the floor clear.

*Prognosis* depends upon the extent and condition of the ulcer and the age and general health of the animals. In general, aged, diseased dogs are less favorable patients than young or healthy animals. Prognosis also depends somewhat upon the early recognition of the ulcer. As a rule the earlier recognized and treated, the better the prognosis. Hence all cases of keratitis should be examined carefully for loss of tissue. In cases of doubt, a drop of fluorescein solution (fluorescein, 1 per cent; sodium bicarbonate, 2.5 per cent) placed into the eye and immediately washed out will aid in the diagnosis. This preparation stains any denuded area a bright green but does not effect sound tissue. While making the examination one must note the condition of the ulcer—that is, whether it is in an active or healing stage. An active ulcer will have ragged edges, convex grayish base and general cloudiness and be accompanied by other local disturbances. If healing, the edges are rounded, smooth, clear, the cloudiness clearing and the acute symptoms subsiding.

*Treatment.*—In simple ulcers the cul-de-sac of the conjunctiva should be irrigated thoroughly with one of the mild antiseptics mentioned under nonsuppurative keratitis. Pain and photophobia may also be handled similarly. These simple ulcers often heal promptly under atropin and boric acid solution or if the ulcer be touched with a 1 per cent solution of silver nitrate or strong phenol. If accompanied with conjunctivitis, this disease must be treated also. We have found it necessary in most cases to cauterize before we could stop the progress of the ulcer. Our plan has been to outline the ulcer with a drop of fluorescein solution which stains the ulcer green. Then apply strong phenol on a probe, being careful first to shake off any drops that might accumulate. It is impossible to state whether there is any benefit from the fluorescein solution, but it seems that those cases upon which it has been used do better than the others. After the acute symptoms have subsided, or from the beginning in

some cases in which the ulcer has been torpid, some stimulation is needed. For this purpose yellow oxid of mercury ointment, 2 to 5 per cent, iodoform or calomel dusted on the cornea or in ointment, do well. Recently we have used more ointments than powders, but always irrigate the conjunctiva sac thoroughly before massaging with the ointment.

*Deep and sloughing ulcers.*—Hot fomentations and irrigation with the agents mentioned above are useful. Atropin is especially useful to prevent iritis and lessen pain. All solutions should be sterile to avoid infecting an otherwise simple ulcer. Some recommend a weak solution of eserin ( $\frac{1}{4}$  to 1 grain to the ounce). It is claimed that this drug stops the migration of white cells or promotes absorption through dilation of the ciliary vessels. Like all other myotics, eserin lowers intraocular pressure and thus lessens tendency to rupture of the cornea. Other authorities are of the opinion that atropin is invariably the better drug.

If the ulcer still progresses in spite of the milder measures, as is often the case, more heroic treatment is necessary. It may be curretted with a sharp knife or spoon until all necrotic material is removed, and the edges then touched with a mild caustic. Strong chemicals may be applied directly to the ulcer by means of a probe or a probe carrying a small tuft of cotton, taking care not to wound the sound tissue. Many chemicals may be used; silver nitrate, 5-10 per cent, or in stick; liquid phenol, 95 per cent; tincture of iodine; formaldehyde, 1-50 per cent, and many others. The actual cautery is also recommended. In each of the above-mentioned methods the eye should be anesthetized after a thorough irrigation and for the best results the ulcer outlined with fluorescein.

We have recently used liquid phenol (95 per cent), as mentioned previously, more than any other caustic. We depended upon silver nitrate in strong solution or stick for a long time, but phenol has given us better results. Dionin is often of distinct service. It acts not only as a lymphagogue and an analgesic, but also seems to be of distinct benefit in stimulating regeneration.

In cases in which perforation seems certain in spite of treatment, a dry pack should be applied and kept in position except when dressing. If the floor of the ulcer bulges, it is well to relieve the intraocular pressure by paracentesis of the cornea.

In small round ulcers this may be done through the floor of the ulcer, but when the ulcer is large and irregular perhaps the regular operation will do better, and yet it has always been our custom to puncture through the floors of even these. Sometimes it is necessary to repeat the operation upon several successive days. The escape of the aqueous lowers pressure, relieves pain, favors healing and tends to prevent perforation of the cornea with its attendant sequelæ.

*Perforation.*—It frequently happens that the cornea is ruptured with the escape of the aqueous and prolapse of the iris. In other instances, and especially if the iris has been contracted with atropin, only the membrane of Decemet protrudes, showing a bulging of a thin transparent membrane. In such cases puncture the membrane and draw off considerable of the aqueous. With the diminished pressure the membrane will often return to its natural position. If there is complete perforation with protrusion of the iris, atropin or eserine, according as to whether the rupture is central or peripheral, should be pushed and at the same time efforts made to return the iris with a probe. If unable to return, grasp with forceps, pull out and remove with scissors as close to the cornea as possible. If the perforation has been large, a staphyloma will result in spite of any treatment.

In cases in which there is no protrusion of the iris, the opening may be closed by granulating tissue which may be so great as to grow beyond the level of the cornea and need removal. This condition is often spoken of as a staphyloma but is in reality granulating corneal tissue. The excess tissue can be removed with a knife or scissors.

*Sequelæ.*—No discussion of ulcerous keratitis would be complete without considering the sequelæ. The most common is the cicatrix shown by a dense white spot. The thicker and whiter these spots, the less remedial to treatment, but much benefit will often follow from massage with yellow oxid of mercury or other stimulating ointment. The massage should consist of lateral, vertical and radial movements, completed by circular ones over the closed lids following the application of the ointment and lasting from one to two minutes. We have had good results from daily alternating dionin with the above-mentioned ointments. Sometimes we use dionin for a few days or until the eye becomes immune to it and then use the ointment for a few days, following again with dionin. It is not possible to clear



up all these scars entirely, but it is possible to save the eye with little disfigurement in most cases.

*Staphyloma*.—The distention of a cicatrix to which the iris is attached is called a staphyloma. It is due to the fact that the scar tissue does not stand the intraocular pressure and consequently it is pushed forward. The treatment is preventive and has already been described. If the case is more severe than just to allow the prolapse of the iris, no treatment will avail and an enucleation is indicated.

*Hypopyon* consists of a collection of pus in the anterior chamber. It does not come from the cornea but from the vessels about the periphery of the cornea and ciliary body and iris. The only treatment is to evacuate the pus by paracentesis of the cornea.

#### DISCUSSION

CHAIRMAN FLYNN: You have listened to a well-prepared paper on a subject that is very important to the small-animal practitioner. There is nothing that gives your client more worry than to see something wrong with his pet's eye. Particularly in keratitis of the cornea, when the animal is unable to see, the owner is very much worried and wants something done right away, and he is nearly always willing to leave the animal in the hospital indefinitely in order to get results.

Is there anyone who wishes to discuss this paper or ask any questions of Dr. Milks?

DR. QUITMAN: I should like to ask Dr. Milks whether I understood him right when he recommended the use of nitrate of silver in touching up the ulcers in the ulcerated keratitis.

DR. MILKS: We used that for years.

DR. QUITMAN: Don't you consider that a means of inducing a permanent opacity, inasmuch as you have formed in the cornea a silver chlorid that is absolutely insoluble, and no treatment you can give it afterwards will ever remove it? It is an absolute chemical law that you will get it. I have noticed it and I have seen it where cases have come to me from others. I have seen the silver chlorid opacity there; it is distinct; one can always tell it. It is a chemical law that you are bound to get a deposition in the cornea of silver chlorid which is insoluble in everything and absolutely impossible to remove.

DR. MILKS: Most of the chlorid is immediately washed out with the tears. That remaining in the ulcer is shed with the necrotic material. We have never caused argyrisms with silver nitrate but have had it follow the use of some of the organic silver preparations.

DR. QUITMAN: Did you ever touch the ulcers, say, every day or every other day with tincture of iodine?

DR. MILKS: We do use some iodine but only for one or two applications.

DR. QUITMAN: Mercury ointment acts nicely in some cases, but nitrate of silver I don't approve of.

DR. MILKS: We have used it a number of years without causing a permanent silver stain. Many of the eye authorities recommend it and I believe Dr. Baker recommends silver nitrate for this purpose in his Theory of Practice. We haven't used it since we have used

the phenol because the phenol has given better results and the action is more prompt.

DR. QUITMAN: What did you mean by fluorescin?

DR. MILKS: Fluorescin is an anilin dye.

DR. QUITMAN: Anilin green?

DR. MILKS: It is a red dye that turns the cornea green. You can tell the progress of the ulcer pretty well. If you drop it in some morning and don't get any colorization, you know you have got it beaten.

CHAIRMAN FLYNN: There is another agent I find quite useful in cauterizing these ulcers; that is trichloracetic acid. If you use it, you must touch the ulcer and get away and not allow it to run over the surface of the cornea.

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### DAIRY COW NOW BIG FACTOR IN PROSPERITY OF OKLAHOMA

A recent map of Oklahoma indicating by marks of various shapes the location of cream stations, ice cream factories, creameries, pasteurizing plants, and combination plants, shows the dairy cow now as a big factor in the prosperity of the State. Formerly, on account of the cattle tick, such a development of dairying was impossible, but the antitick activities of the State and Government for the past six or seven years have resulted in the eradication of the pest from 43,255 square miles, or about 90 per cent of the infested territory.

As a result of these strides in eradication the figures on dairy production show large totals, and in 1921 milk and butter were important products. During that year 9,939,895 pounds of butter fat in the form of sour cream was produced, selling for a little more than \$4,000,000, and 9,529,722 pounds of butter, valued at \$3,240,000. More than 10,000,000 pounds of sweet milk was bought for making ice cream. Pasteurizing plants reported handling 62,261,983 pounds of milk. The figures are from reports received from 26 creameries, 44 ice cream plants, and 30 combination plants operating in Oklahoma or just outside its borders and buying from Oklahoma farmers.

Before the cattle tick was attacked in earnest dairying in the State was of very little importance.

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### GERMANY ADMITS AMERICAN CATTLE

A Berlin dispatch states that American cattle may now be admitted into Germany for immediate slaughter through the government stockyards at Duisburg and Meiderich.

## EQUINE INFECTIOUS ANEMIA<sup>1</sup>

By R. A. KELSER

*Captain, Veterinary Corps, United States Army; Veterinary Laboratory Section, Army Medical School, Washington, D. C.*

DURING the past thirty years, equine infectious anemia, swamp fever, pernicious anemia or equine malaria, as the disease has been variously termed, has been reported at irregular intervals from different sections of the United States. For quite a period following the recognition of the disease in America the malady was known to exist only in Manitoba and, in the United States, in Minnesota. Subsequently, however, it has been reported from a third of the States in this country, including at present Washington, Nevada, Minnesota, Wyoming, North Dakota, South Dakota, Nebraska, Kansas, Missouri, Wisconsin, Oklahoma, Texas, Mississippi, Louisiana, Virginia and New York. Not being confined to any particular section or sections, the disease undoubtedly is even more widespread than our records tend to indicate.

In America the malady has been studied by Torrance (1),<sup>2</sup> Van Es (2), Francis and Marsteller (3), Mohler (4), Kinsley (5), Mack (6), Scott (7) and a number of others, and while our knowledge of the disease has been improved considerably as a result of the efforts of these and other investigators, we have by no means cleared all phases of the problem.

In November, 1921, the writer was ordered to Fort Robinson, Nebr., to investigate an outbreak of disease among the brood mares of the Remount Depot at that post, the malady proving to be infectious anemia. The history of this outbreak is briefly as follows:

Between April and November, 28 animals were admitted to sick report suffering from an obscure effection, which in the early part of the outbreak was diagnosed variously as anemia, septicemia, septicemia hemorrhagica, etc. With the exception of one case in a colt, the trouble was confined exclusively to the

<sup>1</sup> Presented at the fifty-ninth annual meeting of the American Veterinary Medical Association, St. Louis, Mo., August 28 to September 1, 1922.

<sup>2</sup> Numerals in parentheses after authors' names refer to list of literature at end of paper.

brood mares of the depot, a group of approximately 100 animals. The colts obviously were closely associated with the mares, yet only the one case occurred among them. Because the disease was thus restricted, and in view of the fact that these mares had been vaccinated against infectious abortion, the opinion was held locally that the vaccination was responsible for the trouble.

Of the 28 cases 15 had terminated fatally, 6 had been discharged and 7 were on sick report at the time of the writer's arrival at Fort Robinson. Of the 7 on sick report there was some doubt as to the diagnosis in one case. Several of the fatal cases were definitely known to be relapsed cases. Because the identifying numbers of the various animals affected with the disease were not recorded in the early part of the outbreak, it was impossible to determine definitely just how many of the affected animals were "relapses" rather than new cases.

#### SYMPTOMS

The symptoms manifested by the animals in this outbreak may be summarized as follows:

The animals appear greatly depressed, are extremely weak, the weakness in the hind quarters being an outstanding symptom. When forced to move the animal staggers. A rise in temperature to 103-104.5° F. was noted. In those cases which assumed a chronic character, the temperature gradually dropped to normal, followed in several cases by subsequent rises at irregular intervals. In those cases which ran an acute course the temperature remained high. The pulse was weak and increased in frequency, the most rapid noted in the cases examined by the writer being 60. There was marked inappetence during the febrile periods followed by a good appetite in the chronic cases without marked fever.

Examination of the conjunctivæ demonstrated them to be of a pale, "dirty pink" color. Small hemorrhages were noted on the conjunctivæ of several cases, and in a number of the cases similar hemorrhages were seen on the nasal mucous membrane. Some of the cases had a slight serous discharge from the eyes and nose. The anemic condition of the visible mucous membranes was marked in the chronic cases. Edematous swellings were noted on the head, lower extremities, in the sternal region and lower abdominal wall.

The blood of 5 chronic cases was examined by the writer. The red cell counts varied in the different cases between 3,250,000 and 4,300,000. The hemoglobin determination (using a Tallquist scale) varied between 45 and 70 per cent. Microscopic study demonstrated the presence of malocytes and microcytes. Scarcity of eosinophiles, a condition noted by a number of investigators, was an outstanding feature in the blood examination of these animals.

Urine specimens from two chronic cases were examined, a trace of albumin being found in one case while the other was entirely negative.

The writer had the opportunity to examine but one acute case. The red cell count in this instance was 6,125,000 and the hemoglobin determination 80 per cent. An analysis was made of a specimen of urine from this animal and a considerable quantity of albumin demonstrated.

The course of the disease varied from a few days to two and a half months, the exact duration, however, not being determinable because the animals were destroyed upon establishing the diagnosis of infectious anemia.

#### POSTMORTEM FINDINGS

At autopsy the carcasses were found to be greatly emaciated, except in the case of animals dying from an acute attack of the disease. The small amounts of fat present in some cases were generally of a yellowish tinge. Varying amounts of a yellowish or bloody fluid were found in the abdominal cavity in most instances.

Hemorrhages in the serous membranes and in the intestines, especially the large intestines, were found. These hemorrhages varied in size from that of a pea to as large as a silver dollar.

The liver in some cases appeared extremely pale, in others there was no marked change in color, but almost without exception they were extremely friable. The spleen was noted to vary in appearance from normal to three times its normal size and ruptured (see Figures 1 and 2). Petechiæ were noted on the surface of the spleen in several instances. The kidneys showed evidence of parenchymatous degeneration in a number of the cases, and in one instance small hemorrhages were noted under





Fig. 1—Much enlarged spleen from case of infectious anemia, showing petechiæ on parietal surface.

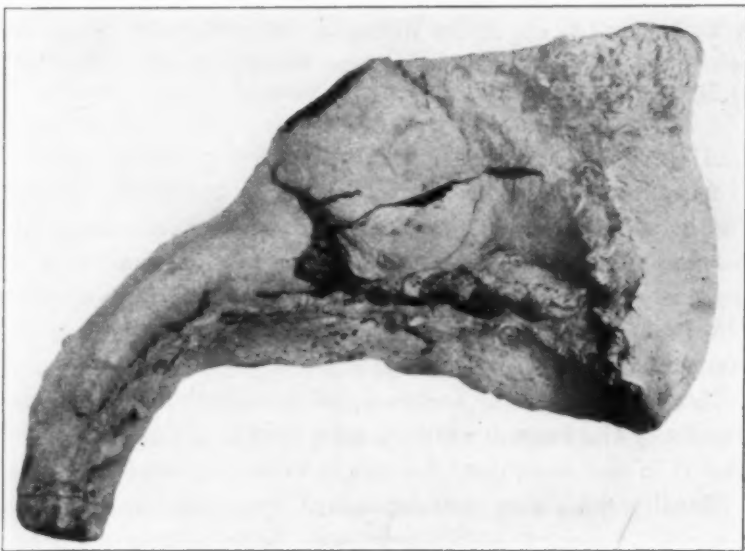


Fig. 2—Visceral surface of same spleen shown in Fig. 1, showing rupture which had begun to heal.

the capsule. The organs of reproduction appeared normal. A mild cystitis was noted in one case.

The lymph glands, especially the mesenteric, in a number of instances appeared swollen and of a dark red color. The lungs generally appeared pale and in a number of the cases showed

small hemorrhages, some being as large as a dime. Petechiae were noted in the heart fat and ecchymoses on the endocardium.

Examination of the bone marrow of the long bones of the upper extremities, especially the femur, showed the spongy bone marrow of the proximal ends to be of a reddish color. The yellow fat marrow of the medullary canal contained dark red areas. This condition has been held by numerous investigators as a prominent finding in infectious anemia. This phase of the condition, however, was given subsequent study and will be discussed further along in this paper.

#### GENERAL CONSIDERATIONS

Fort Robinson takes in approximately 12,800 acres in addition to a good-sized wood reserve. It is located in the far northwest corner of Nebraska only a short distance from the Wyoming line on the west and the South Dakota line on the north. Two streams of water, White River and Soldier Creek, run through the reservation. The animal population at the time of the outbreak of infectious anemia was approximately 700.

The investigation of this outbreak revealed the fact that the brood mares and their colts had been pastured and sheltered separately from other horses at the post for about two years, except for an occasional mare brought in for work, in which case she was kept in a stall in a stable with other work horses.

Of four pastures utilized by the brood mares and their colts, two were bottom pastures, consisting of approximately 50 acres each. One of these bottom pastures was admittedly the most boggy on the reservation, part of it being under water when inspected by the writer. It happened that, with one exception, no pastures over which the mares had grazed were used for other horses. The exception noted was an instance where the mares and their colts were temporarily turned into a large high and dry pasture of about 2,000 acres for about two weeks. This pasture was later used for other animals without detrimental results. Because of these conditions it was not surprising that the infection was confined to the group of brood mares.

Several of the animals which died of the disease were known to have been local purchases. Further, it was learned that a disease of horses, manifesting itself similarly to that encountered at Fort Robinson, had been more or less prevalent on several

farms in the vicinity. Thus, the disease appeared to have been introduced at Fort Robinson by one or more of these locally purchased mares.

Measures inaugurated with a view to eradicating the disease consisted of the prompt destruction of those cases on sick report and proper disposal of their carcasses. This was followed by thorough disinfection of the hospital buildings, stables, etc. The next step was to isolate those cases which could be identified as having previously been on sick report suffering from an ailment which, from the diagnosis, was suspicious for infectious anemia. There were 8 such cases. The remaining mares in the group were then given a thorough individual physical examination and those appearing at all unthrifty were isolated as a second group. The remaining animals were then isolated as a third contact group. Of the 8 animals with previous hospital records, all subsequently manifested symptoms of the disease and were destroyed. No new cases occurred among the remaining animals until just previous to the writer's departure for this meeting, when a report was received by the Surgeon General's Office to the effect that another case had occurred.

A review of the literature on infectious anemia shows a disagreement among various investigators on several important phases of the infection. Chief among these is the variation in views as regards the natural mode of infection. It has been conclusively shown that besides the blood, the urine of affected animals contains the virus of the disease, and until a few years ago natural infection was generally thought to be through ingestion of feed and water contaminated by affected animals. In 1914 the Japanese Commission (8) published the results of their four years and ten months investigation of the disease, and indicted the horsefly family (Tabanidæ) as the transmitters of the disease. They eliminated the stable fly (*Stomoxys calcitrans*) as a transmitting agent.

In 1919 Scott (7) of the Wyoming Station, in a paper presented before this Association at the New Orleans meeting, reported the results of his transmission experiments and named the stable fly (*Stomoxys calcitrans*), as well as Tabanidæ, as transmitting agents of the disease.

In the Robinson outbreak a number of the cases made their

appearance subsequent to the fly season. However, as previously indicated, it was impossible to tell how many cases were relapses rather than initial attacks. On the other hand, general conditions at Fort Robinson seemed to point more toward pasture infection than to insect transmission.

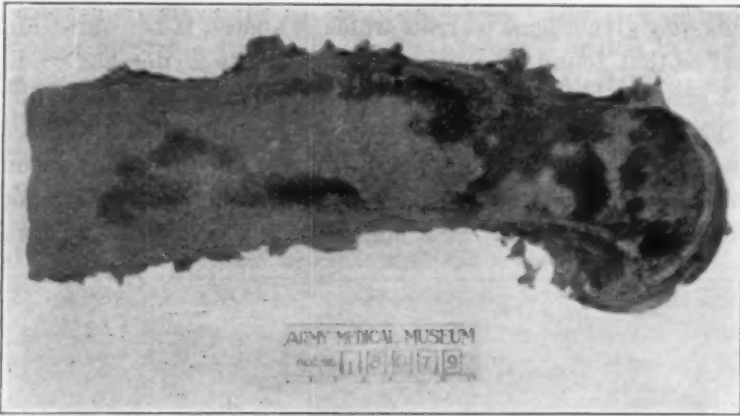


Fig. 3—Proximal end of femur from case of infectious anemia, showing condition of bone marrow.

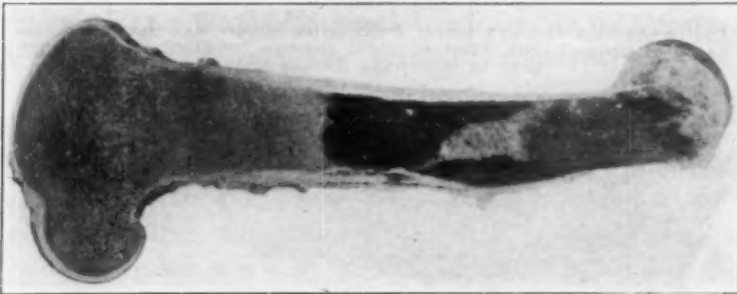


Fig. 4—Section through femur from case of infectious anemia, showing condition of bone marrow.



Fig. 5—Section through femur from case of infectious anemia, showing condition of bone marrow.

Another point which has been questioned in the last few years is the bone-marrow findings previously referred to. In 1915 Theiler and Kehoe (9) called attention to the fact that the marrow changes were not pathognomonic of infectious anemia. In 1919 Wright (10) reported his findings in this connection at the New Orleans meeting, and showed that "other disease conditions may give a bone marrow which is almost, if not quite, identical to that found in equine anemia." The writer has studied this phase of the problem and is in full accord with the findings of Theiler and Kehoe and those of Wright. Figures 3 to 8 show the appearance of the bone marrow in cases of infectious anemia, that in bones from horses that were destroyed because of general unthriftiness, and that of a horse which was destroyed because



Fig. 6—Section through femur from horse which was destroyed because of general unthriftiness. Bone marrow indistinguishable from that in infectious anemia cases.

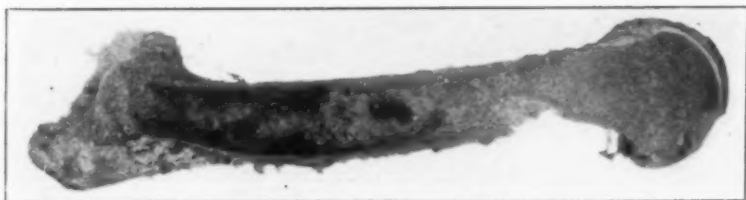


Fig. 7—Section through femur from horse which was destroyed because of general unthriftiness. Bone marrow indistinguishable from that in infectious anemia cases.

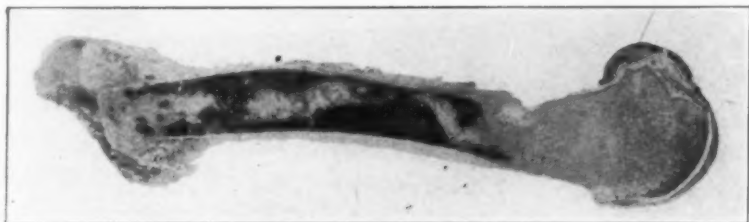


Fig. 8—Section through femur from horse destroyed because of chronic lameness. Animal was in excellent flesh. Bone marrow indistinguishable from that in infectious anemia cases.



of chronic lameness, the animal being in excellent flesh and condition otherwise.

#### CONCLUSION

In concluding these remarks it is desired to emphasize the need for continued study of this insidious malady. We need to know more about the nature of the virus. Our lack of knowledge of filterable viruses generally, of course, makes the problem an exceedingly difficult one. We pass material known to contain an infecting agent through bacteria-retaining filters, and if the specific disease can be produced with the filtrate the best we can do is to classify the etiological element as an "ultramicroscopic filterable virus." Here we must stop, the exact nature of the infecting agent remaining a mystery.

It has been suggested by several investigators that the virus of equine infectious anemia is probably protozoan. Without going into the merits of such a hypothesis, it is striking that the malady has many of the earmarks of a protozoan affection. The course of the disease, intermittent fever, recurrent attacks, destruction of red blood cells and the persistence of the infecting agent in the blood of arrested or apparently recovered cases for long periods of time, are certainly suggestive.

Finally, more definite and practicable means of diagnosing the disease would be of material advantage in the control of the malady. At present the diagnosis of the affection in individual cases, particularly in the beginning of an outbreak, is an exceedingly difficult proposition. Because of its insidious nature, it frequently happens that the disease is well established on a premise before its nature and infectiousness are recognized. Where the malady is suspected inoculation of a susceptible horse with blood from a suspicious case is of great value in establishing a diagnosis. In practice, however, such procedure, for obvious reasons, can not always be resorted to.

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#### DISCUSSION

DR. C. E. COTTON (St. Paul, Minn.): This very excellent paper, in my opinion, leaves not much room for discussion, but the point brought out in reference to diagnosis I think can not be given too much stress, particularly an examination before establishing a quarantine. I feel we should be very strongly impressed, before anyone makes a diagnosis, that he must have an autopsy.

We frequently find that our field men, in the northern parts of our State, will make a snap diagnosis without holding autopsy. Upon further examination, we find—particularly in the new territories—that the trouble is not due to infectious anemia, but is due to an infestation of parasites. These parasites may be the carriers of infection, but we have had no cases of infectious anemia being diagnosed without autopsy, and we found it due to parasitic infestation.

The point that Captain Kelser brought out, that you should inoculate an animal and produce the disease, is very, very important, and we agree that you must not make the diagnosis without inoculation, particularly if you have no history of the disease in that territory.

DR. CAMERON: I would like to ask Dr. Kelser if he attaches any particular importance to the enlargement of the spleen. In no case of swamp fever have I personally ever noticed any enlargement; in fact, very little pathological enlargement of the spleen.

Also in regard to the diagnosis: It is certainly important in the early stages. Where you get a chart showing the temperatures which are fairly characteristic, it is simpler. I have under observation

cases which no man could diagnose as swamp fever. They appear normal, but if their blood is taken and injected into other horses it will infect them. Those horses have been under observation since 1912. I feel it is an open question whether they are ever cured.

DR. HOSKINS: Along the same line, in regard to the findings in the spleen, I would like to ask Captain Kelser whether he noticed thrombosis of the spleen or thrombosis in any of the other organs, particularly the liver.

If I got all of the States mentioned in Captain Kelser's list, he omitted Michigan. Michigan should be included among the States where the disease has been found. It was diagnosed by Dr. Brenton some ten or twelve years ago, in southeastern Michigan, and several times since then, and proved by inoculation to be swamp fever. I have later intimate information regarding these outbreaks, and they point to the probability of being pasture infections in all three cases that have come to my notice.

DR. BUX: I would like to ask the gentlemen who have discussed this paper what they found to be the most satisfactory treatment.

DR. WATSON: I am not going to answer that question as to a satisfactory line of treatment, because we have not found any, notwithstanding all the experiments made with that point in view. With regard to diagnosis, Dr. Cotton says we have only one method that is certain, and that is the inoculation of another animal. As Dr. Cameron mentioned, our investigations have been under way for twelve years. We have, from one lot of animals that were sent to us with swamp fever, cases where we inoculated a healthy animal and verified the swamp fever infection by reproducing it in healthy animals. The survivors of those animals are carriers of swamp fever infection today. Only a few months ago we took the blood of one of these animals that has been one of our best work horses, and his blood today is producing typical cases of swamp fever, ten years after recovery. How are you going to take measures of quarantine when we know that there are swamp-fever carriers that may be carriers for the rest of their natural lives? One of the objects of research work in swamp fever is to arrive at some method of diagnosis, because it is too expensive to inoculate a healthy animal every time; but there is no way to determine swamp fever without inoculation, and the horse is the only animal that I know of in which we can produce a definite swamp fever. That is the problem—diagnosis; treatment has failed.

I believe Dr. Cameron has mentioned that no method of treatment has proved satisfactory. We get a certain percentage of cases where recovery seems to take place after the treatment, but when you bear in mind that probably 50 per cent of those cases will recover without treatment, if the case is light, with any treatment you can employ there is no way of proving—except by inoculation—whether you have cured it.

CHAIRMAN REED: If there is no further discussion I will call upon Captain Kelser to sum it up.

CAPTAIN KELSER: Answering Dr. Cotton's remarks, we did make an examination of those cases that died of the disease, and we found a mild parasitic infestation among those animals. As Dr. Cotton has pointed out, infectious anemia is frequently associated with parasites, and so frequently in some cases, in certain outbreaks, that a number of investigators have been led to believe that it is actually due to parasites.

In answer to the question regarding changes in the spleen, that is not, so far as I have been able to find, a pathognomonic change or a characteristic change. Generally, in the acute cases, there was a mild enlargement of the spleen, varying up to this one case. The reason I showed that was because it was an exception; it was twice

normal size and ruptured. The acute cases showed mild swelling with hemorrhages, but in some of the chronic cases the spleen appeared normal.

In answer to Dr. Hoskins's question, I autopsied seven cases that died or were destroyed, and in the case from which the spleen was removed I could determine no evidence of thrombosis. In the other cases I made some special examination to determine that fact.

Regarding diagnosis: As Dr. Watson pointed out, it is impossible to diagnose the disease from any description or symptoms which you might find, or through any particular tests. The only test we have is the inoculation test. If you go into a community and the farmer has three animals and one was swamp fever, he is certainly not going to inoculate the others. That test can not be used except in large outbreaks, where it is a case of using one animal to save the lives of others.

The carrier proposition is very important. The case he mentioned of ten years is very interesting. In going over the literature I found a number that were shown to be carriers after four or five years, but ten years is longer than any I ever heard of.

I would like to ask Dr. Watson what his opinion is regarding the possibility of a protozoan infection. It does have some of the earmarks, especially regarding the persistence of the organism in the blood.

DR. WATSON: That question of protozoan origin in swamp fever has appealed to every investigator. I remember Dr. Rutherford, who was one of the first to diagnose swamp fever on this continent, used that as his first idea, and in every attempt we have made for years we have proceeded from the protozoan point of view. Of course, that Japanese work lent another supposition to it. Outside of the Japanese I do not know of anyone who has succeeded in demonstrating this protozoan in swamp fever, but there is no question as to the disease being apparently of a protozoan origin, after comparing the swamp fever sufferer over two or three years with certain protozoan cases that we know of. The fact remains, however, that we can not demonstrate any protozoan at present in swamp fever.

As the transmission of the disease might come into consideration, viewing it from a protozoan point of view, we know the fly theory, and apparently some cases are transmitted by flies. But when you come to put them in conditions where the fly could transmit the disease, you usually fail to reproduce it. I have nothing more to add. We are still looking for the protozoan, but we have not found it yet.

DR. HOSKINS: One remark on the probability of the correctness of the protozoan theory of this disease. I believe it is true that practically all protozoa are connected up or intimately associated with an intermediate host. The protozoa are not highly resistant organisms. As against the protozoan theory we have the knowledge that the swamp-fever virus is highly resistant. Several years ago, I took the blood from a case and dried it and pulverized it and kept it in a finely powdered state for approximately a year, at ordinary room temperature, and upon resuspending some of this powdered, dried blood in salt solution and injecting it into a horse it proved to be just as virulent as it had been a year previous. To my way of thinking, that hardly fits in with the protozoan theory.

DR. CAMERON: I believe this disease is not given the importance that it should have. The use of horses in the preparation of vaccine serums must be very dangerous, where a disease like this is not recognized, and it appears to be spreading all over the world. The possibility of the infection being transferred in these bacteriological products I think is very serious. In South Africa they take the precaution of not using any serum for horse sickness until it has

been stored for one year. This they believe excludes the possibility of the infection from swamp fever.

DR. HOSKINS: That point was brought out in the discussion of papers on swamp fever at the New Orleans meeting. At that time I related another experiment that I had made, which showed very conclusively that the preservatives which are used in commercial serums—that is, four-tenths per cent creosote or a half per cent phenol—will destroy the swamp-fever virus, whatever it is.

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### THE LAST RACE

An artist great has pictured Death upon a spectral steed.  
I've looked that horse all over and don't think he has much  
speed.

So when I know Death's coming, ere I meet him face to face,  
There's nothing I'd like better than to give him one last race.

Now, Tea Tray, pay attention when you hear the Great Judge  
call,

And come back to things terrestrial, to your old box stall.  
I've got my racing saddle yet, and if you want to run,  
I'm overweight—but you won't mind—once more we'll have  
some fun.

You were mighty temperamental, but when you were inclined  
There was nothing could outrun you when you'd once made up  
your mind.

You'd often let the bunch away because of some queer whim,  
Then you'd burn the track up after 'em, and generally you'd  
win.

Maybe that Death's a grim old sport and just twixt me and you,  
I'll make a side bet with him and give odds of three to two.  
About the track or weather I know you'd never care,  
In heat or cold, in sand or mud, we'll race him anywhere.

Just think of what a crowd there'll be, for unless all guesses fail,  
The sporting Shades from all the past will gather at the rail.  
We'll run the race, and win or lose, I'll wave a last farewell,  
Then, arm in arm, I'll walk with Death to where the spirits  
dwell.

N. S. MAYO.

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## BOT ANAPHYLAXIS<sup>1</sup>

By A. E. CAMERON

*Veterinary Research Station, Lethbridge, Alberta*

FOR SOME YEARS information has been received of losses of range horses in Alberta in the early spring. In 1922, following the severe snowstorms at that period, reports indicate a heavy mortality. In one instance out of a bunch of 250 horses 50 head are said to have succumbed. The disease is known as "jiggers," no doubt from the nature of the symptoms exhibited. These are a trembling of the large voluntary muscles, especially of the hind quarters, followed by incoordination and death.

Unfortunately no opportunity for postmortem examination has presented itself, but where examination has been made by the ranchers they report this year a heavy infestation with bots. In one case the owner stated that the bots found in the stomach of a yearling would "fill a coal scuttle." Some of the deaths, where stockmen have been fortunate enough to observe them, were reported to be very sudden and apparently without previous abnormal condition being observed.

Dr. J. C. Hargrave, who forwarded this information, with the suggestion that some experimental work might be carried out, advanced the interesting theory that possibly the deaths were the result of anaphylaxis from the absorption of bot toxins. In the weakened condition that range animals are at this time of year and with the stomach empty from forced abstinence from food during the severe snowstorms, the sudden absorption of toxic products when the bots are in large numbers might account for the sudden deaths, while the less acute cases might produce the condition that stockmen term "jiggers."

This theory was based on the *Hypoderma* anaphylaxis in cattle reported by Hadwen (*Journal of the A. V. M. A.*, April, 1917). Hadwen showed that animals subject to such a reaction were susceptible only to the species of parasite common to them and to which they had become sensitized; also that accidents causing injury to the parasites while situated under the skin of the back caused the anaphylactic shock in a similar manner to cases which had the *Hypoderma* larvæ extract injected into them.

<sup>1</sup>Presented at the fifty-ninth annual meeting of the American Veterinary Medical Association, St. Louis, Mo., August 28 to September 1, 1922. Published by permission of Dr. F. Torrance, Veterinary Director General of Canada.

The theory presented by Dr. Hargrave is worthy of consideration, especially as in this particular year there is known to be a heavy infestation with bots.

At the Veterinary Research Station, Lethbridge, it must be assumed that all horses are infested with bots, as after a large number of postmortem examinations of horses, dead of different causes, none has been found free from these parasites. It was not possible, therefore, with the animals available, to have horses free from bots as controls. Cattle were used, and similar experiments were made on these as were carried out on horses.

The extracts were made from *Gastrophilus intestinalis* and *G. hæmorrhoidalis*. The larvæ of the former were obtained from the stomach of a horse, the latter from the rectum of horses still alive. The bots were snipped in small pieces with scissors and ground in a mortar. Normal saline solution (or in some cases distilled water) was added and the whole filtered through cheesecloth. When injected intravenously it was also passed through filter paper.

The dosage was arrived at by first weighing the bots and also weighing the cheesecloth or filter paper used. The crushed bots were filtered and then the cheesecloth or filter paper containing the residue was allowed to dry and then weighed. The weight of the residue was got by subtracting the weight of the cheesecloth and filter paper. The actual weight of the extract was the difference between the weight of the bots and that of the residue.

The doses given were comparatively small, as it was not desired to kill the horses experimented on. Several of the horses were infected with swamp fever, but apparently in good health. Most of the horses used are unbroken and live outside all the year.

#### EXPERIMENT 1

Horse No. 20 was isolated June 12, 1922, and food was withheld in order to get the stomach empty as would occur in a severe snowstorm.

On the 14th, at 10:36 a. m., the temperature was 99.6, when the horse was given a subcutaneous injection of 0.55 gram of bot extract (*Gastrophilus hæmorrhoidalis*), as calculated above, in 12 c.c. normal saline solution. Within a few minutes of being released from the "squeeze" was walking around in an uneasy manner. At 10:46 lay down and rolled, was biting the fetlocks and rubbing the head. Two minutes later was switching the tail and defecated. Up to 11 a. m. was uneasy all the

time, rubbing the body and head on the corral fence and walking constantly when not rubbing. The itching was severe, causing the horse to bite the legs, especially the fetlocks. There were colicky symptoms, lying down and rolling and when down rubbing the head and neck on the ground. Breathing had become fast and difficult. Up to 11:15 the itching continued, the head was shaken vigorously and occasionally yawning occurred. The respirations were about 70, but difficult to count, owing to the constant movement in rolling and biting all parts of the body. There was some saliva dropping from the mouth with a chewing motion of the jaws and licking of the lips. At 11:11 an urticaria was evident on the shoulders; this was accompanied by sweating in patches. At 11:20 easier with the breathing down to 40, although the itching continued. At 11:30 was placed in the "squeeze" and the rash could be felt all over the body. Released again, there was continual rubbing, champing of the jaws and some saliva dropped from the mouth. Up to noon dozing occasionally and quieter, with respirations down to 27. Temperature 101.2.

There was more or less restlessness until 3 p. m., when the eyelids were noticed to be swollen, breathing increased again to 80, although a horse in an adjacent corral was breathing 16. Remained dull until 3:20, when the rash appeared all gone. At 3:35 sweating increased, with large beads all over the body. At 4 p. m. mucus was dropping from the nostrils. At 4:15 was turned out to pasture, respirations 60, and looking miserable.

Twenty-four hours after injection the swelling at the point of injection in the neck was 3 by 4 inches, the horse otherwise apparently normal, temperature 100.8.

Seventy-two hours after injection the swelling was 8 by 8 inches, and like a typical mallein local reaction, tense and painful.

One hundred and twenty hours after injection the swelling was 2 by 2 inches, but appeared to contain pus. The swelling was opened and some pus evacuated.

On the third day after injection the temperature rose to 103.4 and returned to normal next day.

#### EXPERIMENT 2

Horse No. 28, a swamp-fever animal, had food withheld for 24 hours. On June 15, at 10:34 a. m., was given an intravenous injection of 0.4 gram of bot extract (*G. hamorrhoidalis*) in 25 c.c. normal saline solution. Immediately on leaving the "squeeze" snorted a few times and defecated. At 10:35 was nodding the head and walking around straining to defecate and groaning all the time. At 10:38 uneasy, tail out, heavy breathing, grunting, and neighed once. Straining was severe, drawing the abdomen up and grunting. Liquid was dropping from the

sheath—probably sweat. Two minutes later there were strings of saliva from the mouth and the horse lay down, the rectum was everted and there was much sweat around the anus. At 10:42 the rectum was withdrawn again, sweat was dropping from the lower part of the body; there was heavy breathing and neighing occasionally. Passed gas and continued straining, drawing all the skin of the body into wrinkles. Sweating in patches and evidently suffering great pain. Up to 10:50 there was champing of the teeth; respirations were 45; gas was passed frequently, with heavy straining. Saliva reached to the ground; wrinkles showed on the skin around the nostrils and over the body; the sweat between the wrinkles emphasized them. Some manure was passed. Swaying gait; looked like dropping. The head was held near the ground. Up to 11 more manure was passed, with gas, accompanied with groaning and straining. Sweat was dropping from the body, champing the teeth, moving around slowly and kicking at the abdomen. Vertical wrinkles showed all over the body and saliva was still dropping from the mouth. Excessive straining, labored breathing, and hugging the corral fence. The expression was anxious, and this horse came right up to me, although a "broncho." To 11:10 straining was continued. Lay down. Mucus was discharged from the nostrils. Quiet for a few moments, then biting the fetlocks. Breathing was 40, with grunting and groaning. When lying down would rest on the sternum for a few seconds and then lie flat. The pain appeared to come on in spasms every few seconds. Up to 11:20 eyes half closed, sleepy looking at times; got up, staggered, and down again, half dropping. There was a mucous discharge from the anus. Shook the head up and down, drawing the head back and groaning. When down alternating from the sternum to flat out. When standing the nose was on the ground. Still hard straining, turned the head to the flank occasionally, breathing 42. No urticaria felt. To 11:40 very severe straining; looked as if going to die. Mucus had ceased coming from the nose and mouth. Had a very tired look and breathing labored. Winked the eyelids in a noticeable manner and champed the jaws. Respirations 40. Sweat drying a little. To 11:50 same symptoms continued. There was now bloody mucus from the anus. To 12:30 the same movements, and never rested long in one position. A considerable amount of gas was passed. Respirations fell to 36. A rash appeared on the chest at 12:07. In rising the hind fetlocks were knuckled like paralysis. More manure was passed, and when on the feet very rocky. Relaxation of the sphincter ani, with suction of air at each breath. The head was shaken and there was increasing loss of control, with swaying gait. To 2:15 lying down and getting up, with longer intervals on the feet, but still occasional groans and straining. Turned out to pasture at 2:45; rash all gone, the breathing 70, temperature 100.4. Appears

to be recovering. In moving off the hind legs were stiff, with a minimum of flexing of the hocks. Was eating until 4 p. m., and at 5 p. m. was standing in the shade of the trees.

This was altogether a most distressing sight, and an experiment one would have no inclination to repeat.

#### EXPERIMENT 3—CONTROL

As a control and to show the specificity of the reaction, heifer No. 682 was given an intravenous injection of 0.4 gram of bot extract (*G. hamorrhoidalis*) in 12 c.c. normal saline solution at 1:41 p. m., June 15, 1922.

No disturbance appeared, except that from 1:45 to 1:55 there were some tears from the eyes and threads of saliva from the mouth. This was very little, but distinctly caused by the injection.

Nothing further occurred, and at 2:25 this heifer was chewing the cud peaceably. (While watching this process it was observed that the average number of times of chewing the cud was 40 and varied from 34 to 44.)

#### EXPERIMENT 4—CONTROL

Cow "May" was given 0.25 gram bot extract (*G. intestinalis*) subcutaneously in the neck, June 18, at 6:30 p. m.

There were no symptoms or reaction whatever. The cow continued chewing the cud all along.

On June 19, there was no swelling at the point of injection, and none later.

#### EXPERIMENT 5

Horse No. 4 received 0.25 gram bot extract (*G. intestinalis*) subcutaneously in the neck at 6:35 p. m., June 18, 1922.

By 7 p. m. the conjunctiva was deeply injected. There were colicky pains, and the upper lip was extended, and this horse was rubbing and shaking the head. At 7:20 the upper lip was still being extended. The eyes were swollen like an eye reaction, mainly the lower lid. There was a profuse discharge from the nose and coughing. Sweating in patches all over. At 7:25 very labored breathing, quivering of the muscles of the thighs and shoulders and rubbing the nose. At 7:30 quivering of the muscles was very pronounced and continuous. Still sweating in patches. At 7:40 the large muscles still quivering. Breathing 28, of a sighing nature, and difficult. At 7:50 quivering still very pronounced. There was uncertain lifting of the feet; the expression was anxious, and the horse followed one around the corral, walking slowing most of the time and kicking at the belly occasionally. There was a slight rash on the shoulders and sides of the cheeks, but had to be felt to be noticed. The temperature was 97. At 8 p. m. was rolling, breathing 34, eyes half closed all the time and the muscles still quivering. By



8:25 there was a dirty discharge from the nose; the muscles were still quivering; the horse coughed three or four times at a time, and the upper lip was held out. The abdominal symptoms were slight, but were continuous from the start. At 9 p. m. looked easier and recovery seemed assured, but the breathing was very difficult; there was evidently edema of the lungs. The muscles were still quivering, but not so much. Turned out to pasture.

On June 19, the swelling at the point of injection was 1 by 1 inch and painful. June 20, the swelling was 2 by 4 inches. On June 22, there remained two small lumps of half an inch diameter each.

#### EXPERIMENT 6

Horse No. 7, a swamp-fever animal, was given subcutaneously in the neck 0.14 gram bot extract (*G. intestinalis*) which after filtration had been kept in boiling water for ten minutes. The injection was made at 10:15 a. m., June 20, 1922. By 10:18 the animal had defecated, was switching the tail, and breathing was 48. At 10:28 defecated again. At 10:32 breathing 60, but not labored. At 10:34 again defecated. At 10:42 respirations down to 40. At 10:47 was kicking at the belly and standing in a crouching attitude. At 10:55 was licking the lips and breathing 35. These symptoms were faint, but the breathing was much increased, with mild colicky symptoms. There was yawning and licking the lips occasionally. Two hours after injection appeared quite normal. On June 21, the swelling at the point of injection was 5 by 8 inches and painful. On the 23d, the swelling was 4 by 5 inches, not tense, and apparently not painful. This gradually disappeared.

#### EXPERIMENT 7

Horse No. 31, a swamp-fever animal, received subcutaneously in the neck 0.6 gram bot extract (*G. intestinalis*) which had been kept in boiling water for ten minutes, June 21, 1922, at 10:25 a. m. By 10:30 was rubbing and biting itself and licking the lips. The breathing at 10:35 was 20. To 10:54 was shaking the head and working the jaws, biting the knees and rubbing the face. The two horses injected together, No. 31 and No. 20, were biting each other on different parts of the body. To 11:20 continued shaking the head, biting the legs frequently, winking the eyelids noticeably and yawning. Breathing was 32 and the itching appeared to extend to all parts of the body. At 11:35 was standing quietly. Two small swellings were noticeable at the point of injection. Up to noon was occasionally scratching and biting, yawning, shaking the head and grinding the teeth. There was a rash down the side of the face and below the ears. Temperature 100.5.

At 1:45 was standing quietly and was turned out to pasture. On June 22, swelling at point of injection was 4 by 4 inches,

not very tense. On June 23, swelling 4 by 5 inches, softer, and not painful.

#### EXPERIMENT 8

Horse No. 20, which received a subcutaneous injection of bot extract (*G. hæmorrhoidalis*) on June 12, 1922, was given an injection of bot extract (*G. intestinalis*), 0.6 gram, on the opposite side of the neck, at 10:28 a. m., June 21. At 10:30 was scratching the point of injection with the hind foot. At 10:32 was scratching the neck besides rubbing the head and biting the heels. At 10:35 was evidently itching all over. Up to 11:40 continued biting different parts of the body and legs, the latter especially. Occasionally shook the body.

This was a very mild reaction compared to the first, nine days earlier.

On June 22, the local swelling was 10 by 8 inches and painful. On the 23d the swelling covered the whole neck. This swelling went down and a central area came up with pus which was evacuated on the 25th.

An abscess formed subsequent to the injections on both sides of the neck in this horse, although none of the other horses nor the cow, which had subcutaneous injections, showed any infection.

While the foregoing experiments were being made the opportunity was taken of observing the reaction caused when the bot extract was placed in the conjunctiva. Again cattle were used as controls.

Two bots (*G. hæmorrhoidalis*) were ground in a mortar and 4 c.c. of distilled water added. After filtering, half of this was used fresh and the other half was held in boiling water for ten minutes. (The total amount of extract was 0.2 gram.) The fresh extract was used on horses No. 47 and No. 12. The heated extract was used on horses No. 1 and No. 2. All four horses were swamp-fever horses.

#### EXPERIMENT 9

June 16, 1922, horse No. 47 received 5 minims of fresh bot extract into the conjunctiva. This was administered with a glass syringe without the needle attached, at 10:15 a. m. At 10:20 there was slight lacrimation, and the horse defecated. At 10:50 the eye was more closed than the other. By 11:20 the lower eyelid was swollen. At 12:40 the whole eye was slightly swollen. At 1:45 the swelling of the eye was just noticeable.

This reaction would not have been read as a good eye reaction.

## EXPERIMENT 10

Horse No. 12 received 5 minims of fresh bot extract as above, in the same manner as No. 47, on June 16, 1922, at 10:16 a. m. At 10:20 there were a few tears. At 10:40 the eye was more closed, with a slight mucous discharge. At 12:40 no apparent difference between the two eyes.

At 1:35 another 5 minims was injected into the conjunctiva. At 1:45 was rubbing the face. At 1:50 the eye was a little swollen. At 2 p. m. the area below the inner canthus was swollen. At 4 p. m. still a little swelling below the inner canthus, but not prominent.

This whole reaction was a very poor one.

## EXPERIMENT 11

Horse No. 1 received half the bot extract which had been placed in the boiling water (this had a curdled appearance and was placed in the conjunctiva with the aid of a spatula) on June 16, 1922, at 1:20 p. m. By 1:30 the eyelids were swollen. At 1:35 the eyelids were both markedly swollen. By 2 p. m. there was a good diagnostic swelling. At 4 p. m. the upper lid was markedly swollen, the lower lid less so. This swelling went down gradually, and there was no trace of it on the following day.

## EXPERIMENT 12

Horse No. 2 received the other half of the heated bot extract, as above, into the conjunctiva on June 16, 1922, at 1:22 p. m. By 1:30 the lower lid was swollen. At 1:35 was rubbing the eye, and both lids were swelling fast. At 2 p. m. the swelling had gone down a little and was not quite so pronounced as in horse No. 1, but was a good diagnostic swelling, the eye being half closed. At 4 p. m. there were marks of discharge and still a slight swelling. This gradually went down and there was no trace of swelling on the following day.

Both horses No. 1 and No. 2 were being worked and were observed only at the times given.

## EXPERIMENT 13—CONTROL

Two bots (*G. intestinalis*) were ground and 4 c.c. distilled water added. After filtration this was divided and half was placed in boiling water for ten minutes.

On June 17, 1922, heifer "June" received 10 minims of this boiled extract into the conjunctiva at 3:15 p. m. Up to 5 p. m. there was no trace of any disturbance.

## EXPERIMENT 14—CONTROL

On June 17, 1922, heifer "Molly" received 10 minims of the raw bot extract, the part of which, heated, had been given to the heifer "June." This was placed in the conjunctiva at 3:18 p. m., and up to 5 p. m. there was no trace of any reaction.

## EXPERIMENT 15

Horse "Brownie" received into the conjunctiva 10 minims of raw bot extract (*G. intestinalis*), part of that used on the heifer "Molly," June 17, 1922, at 1:55 p. m. At 1:57 the membrana nictitans was passing across the eye frequently. At 2, the eye was kept closed a few seconds at a time. Two minutes later was rubbing the nose and eye, and some tears were falling. At 2:05 the lower lid was swollen. At 2:10 the eye was kept closed most of the time and tears issued from it. At 2:15 there was a localized swelling below the eye and the whole eye was swollen. At 3 p. m. there was marked swelling of the lower lid, but no tears. At 3:30 swelling started to go down. At 4 p. m., still noticeable, but going down fast. At 5 p. m. the lower lid still slightly puffed but noticeable only if carefully examined.

This was a good reaction.

## EXPERIMENT 16

Horse No. 6, a swamp-fever animal, received into the conjunctiva 10 minims of the boiled extract (*G. intestinalis*), as used on the heifer "June," on June 17, 1922, at 1:56 p. m. At 1:57 was rubbing the eye. By 2 p. m. was rubbing the nose and evidently uneasy and champing the jaws. The eye was kept closed and water was dropping from the corresponding nostril. Two minutes later tears were falling from the eye. At 2:05 both lids were swollen, the lower more than the upper. By 2:10 the whole eye was swollen and almost closed. At 2:14 there was a thread of saliva from the mouth. By 2:20 there was a distinct fold swollen along the upper lid. At 2:30 the eye was markedly swollen and by 2:40 there was more saliva from the mouth and occasional grinding of the teeth.

This reaction was much greater than that in "Brownie."

## DISCUSSION AND SUMMARY

While the experiments carried out would not admit of definitely associating the disease known as "jiggers" with the anaphylaxis produced by bot extract, at least one experiment brought out the characteristic symptom of the disease.

The lesions caused by bots in the stomach have been frequently observed by the writer to be quite extensive, the ulcer passing right through the mucous coat into the muscle, and in a case already reported (*Canadian Veterinary Record*, March, 1921) two bots were found adhered to the peritoneal wall of the stomach quite externally. Other cases are on record where the parasites have penetrated the stomach walls.

It seems probable that in a heavy infestation with bots enough toxin might be absorbed to produce anaphylaxis in a sensitized •

animal. The fact that the animal is sensitized is proof of the absorption of bot toxin, so that cases might well arise during starvation or other causes where enough might be taken into the system to produce serious symptoms or death.

Colic symptoms are prominent in some cases, and bot anaphylaxis may well be an explanation of some obscure cases of colic.

The commonly prevailing idea that bots are harmless may, in any case, be refuted. The lesions found on postmortem ought to be enough in themselves to stimulate a more general effort to rid the host of these parasites.

The symptoms of anaphylactic reaction in the experiments carried out were mainly itching, with occasionally an urticarial rash, action on the bowels, and in one case extreme straining. The difficulty in breathing is no doubt the result of edema of the lungs. The manner of shaking the head would suggest an action on the brain. The whole reaction produced a decidedly tired look in the more acute cases.

There appears to be no doubt that larger doses would have produced death, as has previously been brought about by experimental intravenous injection of bot extracts (Ries, J. N., 1916, quoted by Hadwen).

*Gastrophilus hæmorrhoidalis* was not found to produce a greater reaction than *G. intestinalis*. In the experiments carried out a subcutaneous injection with 0.55 gram of extract of *G. hæmorrhoidalis* (Experiment 1) did not produce a greater reaction than a subcutaneous injection of 0.25 gram of *G. intestinalis* (Experiment 5).

The reaction is specific, as all control animals, cattle, showed no reaction excepting that in Experiment 3, where there was salivation and tears lasting for ten minutes, following an intravenous injection of *G. hæmorrhoidalis*.

Heating the extract in boiling water for ten minutes did not destroy the power of producing an anaphylactic reaction when injected subcutaneously. When introduced into the conjunctiva the reaction was greater in two horses given the boiled extract than in two given the raw extract.

If it were desired to use bot extract as a diagnostic agent the fact that it may be heated would insure that it could be kept free from bacterial action.

The eggs of three different bot flies (*Gastrophilus intestinalis*, *G. hæmorrhoidalis* and *G. nasalis*) were secured from horses at



the Veterinary Research Station, Lethbridge, July 4, 1922, which is earlier than the usual dates recorded. The fly *Gastrophilus intestinalis* was captured July 2. No special effort has been made to find the flies.

The writer desires to acknowledge the assistance received from H. L. Semans, Entomologist, Lethbridge, and A. E. Cameron, of Saskatchewan University, in confirming the identification of different *Gastrophilus* larvæ.

#### DISCUSSION

DR. FITCH: I don't think this paper should go by without showing our appreciation for its value. I am not familiar with what Dr. Cameron has called "jiggers." Is this a disease? We speak of "chiggers," meaning a little parasite. Is this a disease in Canada?

DR. CAMERON: Yes, it is a disease.

DR. FITCH: Will you please describe it?

DR. CAMERON: I explained that the disease is only known to us as "jiggers," and in some cases we find bots in large numbers, bots of horses. In some cases there are no symptoms, and in other cases for a short period the muscles are very noticeably affected; there is motion all over. On my way here, I might say, I met the first veterinarian who had considerable experience with this trouble. He stated that in all the horses on which he had made postmortem examinations he had noticed bots, but, of course, never gave them much attention. All those horses had considerable sand in the intestines.

DR. FITCH: I would like to ask one other question. I noticed in your paper that *intestinalis* produced as much if not more reaction than *hæmorrhoidalis*. What is the relative frequency of these two bots?

DR. CAMERON: The *intestinalis* is much more powerful.

DR. WATSON: I think this condition arises mainly from some special cause. The animal may have been starved for a period before the symptoms of this condition arose.

DR. CAMERON: The veterinarian with whom I discussed this subject said that most of the horses on which he held postmortem examinations had been driven.

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Dr. Z. Strong was a delegate from Vancouver to the recent Liberal convention at Nelson, B. C. He succeeded in getting adopted an important resolution regarding adequate meat and milk inspection.

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Dr. F. Torrance, Veterinary Director General, met several of the B. C. practitioners in the Health of Animals office in Vancouver on October 12 in friendly conference. Dr. Geo. Howell, President, B. C. Veterinary Association, brought up the subject of the practitioners assisting the department in export and accredited-herd testing, and also the employment of laymen to do livestock sanitary inspection.

## **PATHOGENICITY OF BACTERIUM SUISEPTICUS FOR HOGS<sup>1</sup>**

*By A. F. SCHALK and L. M. RODERICK*

*North Dakota Agricultural Experiment Station*

THE POPULAR WAVE of animal diseases due to the so-called group of bipolaris septicus organisms, which have been so conspicuously in the limelight for many years, has recently experienced a rather sharp decline. Although we have neither desire nor inclination to discuss at length the more potent reasons for this marked subsidence, the fact remains that the more successful practitioners, the more searching clinicians and the more careful investigators of animal diseases have shown a much greater disinclination to use the term hemorrhagic septicemia so promiscuously as they have in the past.

That the prevalence of these diseases, with the exception of fowl cholera, has been greatly exaggerated and tremendously overdrawn before the public is now frankly acknowledged by a large number of their most enthusiastic supporters. Now, since the crest of the wave is apparently passed over, a tendency toward more sober and conscientious consideration is being shown on many sides. However, as in most lines of endeavor, where deliberate exploitation and premeditated propaganda are practiced, a marked reaction has set in. Among other ways in which this reaction has manifested itself must be mentioned the urgent demand of many serious-minded people, both breeders and sanitarians, for more definite light upon the subject, the status of which is now generally considered slightly short of chaotic.

Ever since the germ theory of disease became definitely established, we have been using some time-honored expressions in connection with infectious diseases. No discussion of such diseases would appear complete without conveying the idea that the course, extent and termination of the disease depends largely upon the "virulence of the organism involved" and the "resistance of the animal attacked."

Accepting these two measures as determining factors in infectious diseases, let us inquire what is the true measure of

<sup>1</sup> Presented at the fifty-ninth annual meeting of the American Veterinary Medical Association, St. Louis, Mo., August 28 to September 1, 1922.

virulence in the case of the *bipolaris suis* septicus germ with which we are dealing. With a large number of infectious diseases one can at least maintain and in some instances increase the potency or virulence of a virus by repeated passage through its natural host or some experimental animal. The rabbit appears to be ultrasusceptible to the *suis* septicus and serves as a means extraordinary for determining the presence or absence of this organism for diagnostic purposes. When these germs are injected intravenously or subcutaneously into rabbits, they just simply die, apparently regardless of the source, quality or quantity of the virus. It is not at all difficult to obtain any number of strains of this organism which will carry away rabbits within 8 to 36 hours. But inject these same apparently highly virulent strains into susceptible swine and they produce no injury whatever. Thus it would appear that if various strains of these organisms are of sufficient virulence to be of etiologic significance in inducing disease in large animals, they would be sufficiently virulent to kill rabbits in 12 to 36 hours. Those who have had considerable experience with such investigations are only too keenly conscious of the overwhelming majority of cases in which they fail to produce the disease in hogs.

When we turn to the other condition, the resistance of the animal, we are again confronted with a more or less immeasurable and undetermined factor. It is only too common usage for us to say that an organism, such as is represented by the *suis* septicus, which in nature leads a saprophytic existence, suddenly may become parasitic, assume pathogenic properties and produce disease, the result of lowered resistance. As to the real truth of this latter statement there is but scant absolute proof in recorded data. It is largely a matter of assuming and taking for granted, and the assumption is of such long standing that the idea of lowering resistance in various ways is accepted and not questioned.

Those who contend that hemorrhagic septicemia as a primary disease is of great economic importance in the swine industry attempt to explain their contention on the basis that the resistance of the animal is lowered in various ways and the *suis* septicus organism rises up from its saprophytic dormancy and readily attacks and invades the tissues, thus producing disease.

If this be true, it is quite reasonable to conclude that in the course of ordinary hog raising on the average farm at least

some of the "assumed resistance-lowering conditions" are sure to develop from time to time, causing the swine to contract hemorrhagic septicemia.

We have especially designed our experiments along the lines of "lowering resistance" in hogs, if possible, by grossly abusing their hygienic and sanitary conditions. We have not only attempted to simulate those breaches of hygiene and sanitation which are commonly encountered in the average hog-lot, but we have enormously exaggerated them to an almost ridiculous point in our endeavor actually to lower resistance so that they will become regularly susceptible to the suisepticus organisms.

This phase of work was undertaken because of the possibility that these organisms might be an etiologic factor of more or less significance in swine and because of a close correlation to our hog cholera investigations.

The suisepticus organisms used in the experiments represented a variety of strains from several reliable laboratories, as well as a few isolated from swine at this station. All strains obtained from outside sources were of swine origin as vouched for by the laboratories supplying them. Ordinarily several strains were used, grown in plain broth for 24 hours. All strains were carefully checked for cultural characteristics and only those conforming to the *bipolaris septicus* group were used. In the pathogenicity tests on rabbits all strains proved fatal for these animals within 8 to 36 hours. In addition to feeding the cultures as indicated below, in many instances the pigs were also given the entire skinned carcasses of the check rabbits which had died from the inoculations and were fairly swarming with the suisepticus bacteria.

The pigs used were ordinary grades and, with the exception of the wormy one, were in fairly good condition. They ranged in weight from 30 to 80 pounds and, with the exception of five or six, had not been given the serum-virus treatment.

Investigations relative to the susceptibility of hogs to the suisepticus organism and the feasibility of producing an infection with cultures may be grouped into six classes. We believe that infections occasionally produced by subcutaneous and by intravenous injection can have little relationship to infections which might arise under natural conditions. Consequently it was attempted to produce infection by feeding the organism.

## REPORT OF EXPERIMENTS

*I. Starvation rations plus insanitary surroundings plus feeding large quantities of suisepcticus cultures.*

Eleven pigs were used in this series of experiments. They were handled in groups of two or three with the work extending through two summers. It was attempted to lower their resistance by general neglect, so they were held in small houses. The manure was allowed to accumulate, and the rations were restricted to the starvation point. Such management was begun about a month before infection was attempted. They were then given in their feed mixed broth cultures of *Bacterium suisepcticus*. Ten mls was usually used for each pig and given at intervals of one to three days for periods of about four weeks. Although ingesting such amounts of presumably virulent suisepcticus bacteria and continually exposed to such infection in their pens, not a single pig showed any elevation of temperature or loss of appetite during the period of infected feeding. Further, these pigs were injected either subcutaneously, intravenously or intracardially at the termination of the feeding experiment with quantities (1 to 5 mls) of culture which killed control rabbits. They remained unaffected except for some transitory loss of appetite in certain instances.

*II. Starvation rations plus exhaustion plus insanitary surroundings plus feeding quantities of suisepcticus organisms.*

Nine pigs in two groups were exercised by forced driving for a period of three hours until they were nearly exhausted. They were then fed on the meat of four rabbits dead of an injection of *Bacterium suisepcticus*. This procedure was twice repeated, yet all pigs remained unaffected. Likewise five mls intracardial injections of culture produced no untoward results.

*III. Pigs with opened wounds (castration wounds and opened abscesses on the heads) plus bedding and feed contaminated with these organisms.*

These pigs were fed and cared for as usual and given seven infected feeds of various stock cultures, varying from 5 to 125 mls per pig. No disease symptom developed, nor did injections of culture at the close of the experiment induce disease.

*IV. Normal pigs given highly alkalized feed (sodium carbonate) plus feeding large quantities of culture.*

These pigs were given four infected feeds of from 10 to 125 mls. Their feed was previously alkalized with a solu-



tion of sodium carbonate. No disturbance whatever arose, nor did subsequent injections of 5 mls of culture produce disease.

*V. Normal pigs plus sudden change to excessively high protein foods plus feeding large quantities of suisepticus bacteria.*

Three pigs were changed immediately from usual feed to a high-protein ration comprised of tankage, cottonseed meal, middlings, alfalfa and oil meal. They were given at that time 100 mls of mixed broth cultures. This protein feed ration was continued for three weeks and then changed at once to the usual grain mixture and 850 mls of culture given in the feed. Nothing whatever unfavorable happened.

*VI. Wormy pigs plus insanitary surroundings plus feeding large quantities of suisepticus organisms.*

Four pigs were obtained from a farm where they were exposed to a severe *Ascaris* infestation. They were under observation for a month and given four feeds of 15 to 200 mls of culture each. Neither did this nor subsequent intravenous injection produce any disturbance.

It may be assumed that prolonged feeding such as has here been practiced may lessen susceptibility to infection. While such a possibility may exist, we were unable by any procedure to produce an infection except in one isolated instance by intravenous injection, a condition which probably has no parallel in nature. Six untreated pigs were injected subcutaneously with 2.5 mls of culture, two others were injected intranasally, yet no disturbance whatever could be produced.

There is little difficulty in isolating the suisepticus organism from the lungs of hogs which are affected with pneumonia. Spray (Journal of Infectious Diseases, vol. 31, p. 10) found *Bacterium suisepticus* in 168 cases or 54 per cent of the pneumonic lungs which he examined.

One might think that such a frequency of occurrence is indicative of the pathogenicity and causal relationship of the organism to the condition which exists. Examinations were made at this laboratory of the heart's blood and lungs of 19 hogs dead or killed following an infection with the virus of hog cholera. None of these pigs were exposed intentionally to suisepticus infection. Of these, 10 resulted negatively to rabbit inoculation both from the lungs and the heart blood. Of the remainder, 3 were positive with both heart blood and lung. Six were positive with only the lung. Six of the lungs which furnished cul-

tures showed more or less serious hemorrhagic or pneumonic involvement, while 4 appeared normal. It is quite apparent that the organisms could not have precipitated the hog cholera, most of the cases of which were inoculated, so it must be inferred that they were incidental and at most only aiding in the formation of lesions.

#### SUMMARY AND CONCLUSIONS

Extensive experiments have absolutely failed to produce any apparent infection in hogs by the use of methods hereinbefore described.

We are forced to the conclusion, therefore, from these experiments, combined with our routine laboratory examinations, that the pathogenicity of *Bacterium bipolaris suissepticum* for hogs is purely negligible. Such being the case, the occurrence of such infections in swine is rare indeed and furnishes little need for the use of swine plague bacterins. While their presence in the lungs of hogs, particularly those in which a pneumonic process exists, is accepted, we believe that their rôle in the production of disease is a minor one, that they are at most only accidental invaders which are enabled to multiply rapidly in a diseased area which may have been produced by some other injurious agency.

Such pneumonic conditions in hogs are frequently fulminating in character. It would appear that good hygienic and sanitary precautions would be far more efficient in preventing swine disease than the use of biologics which are prepared with suissepticus which is notably low in antigenic value.

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At the request of the Jamaica Government, the British Colonial Office has sent Dr. Connacher, a veterinary expert formerly employed by the South African Government to combat the outbreak of foot-and-mouth disease, which is spreading in the western provinces of the Island.

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The English Ministry of Agriculture has offered two research scholarships in veterinary science, each of the value of 200 pounds sterling per annum, for three years. The scholarships are open to candidates who have obtained the diploma of the Royal College of Veterinary Surgeons or who have shown evidence of proficiency in medicine or other relevant branch of science.

## THE APPLICATION OF VAJDA'S METHOD TO THE EXAMINATION OF FOX FECES<sup>1</sup>

By J. A. ALLEN

*Animal Pathologist in Charge, Fox Research Station, Charlottetown, Prince Edward Island*

IN a recent communication Vajda (2)<sup>2</sup> described a new method for the quick and accurate examination of feces for the eggs of parasites. The basis of this test is that the specific gravity of the diluted fecal material is changed by the addition of glycerin so that the eggs ride on the surface of the liquid.

It is quite obvious that if this simple procedure were as efficient as the older and more time-consuming method, it would be to advantage to employ it, especially in laboratories where the examination of feces is a routine practice.

It is a function of this Station to make parasitic surveys for fox ranchers, and several hundred samples are submitted monthly. In order to find whether this irksome routine could be reduced, a series of tests were conducted to obtain comparative data between the standard centrifugal method and that adopted by Vajda.

In all our fecal work we have employed Pepper's technique as described by Stiles (1). Briefly stated, this method consists in mixing the feces in water, and after the heavier particles are removed, small quantities of the mixture are placed in tubes and centrifuged. The supernatant liquid is poured off, fresh water added, and the process repeated until the supernatant liquid in the tubes is comparatively clear.

Vajda's technique consists in merely mixing the feces, diluted with water to the proper consistency, with varying quantities of glycerin, depending upon the kind of parasitic eggs sought. Thus for *Strongylus*, *Oxyuris*, *Dochmius* and *Æsophagostomum* eggs he recommends the addition of 1 part of glycerin to 1 part of the fecal mixture. Three parts of glycerin are added to obtain the eggs of *Ascaris marginata*, *Ascaris lumbricoides* and *Trichuris*.

<sup>1</sup>Published by permission of Dr. F. Torrance, Veterinary Director General, and Dr. E. A. Watson, Chief Animal Pathologist, Health of Animals Branch.

<sup>2</sup>Numerals in parentheses after authors' names refer to citations to literature at end of paper.

Ascarid, hookworm and lungworm (*Eucoleus aerophilum*) eggs are those most commonly found in fox feces. Coccidia are also comparatively common. In a preliminary series of experiments it was found that ascarid and lungworm eggs were recoverable in greatest numbers when 3 parts of glycerin were added to the feces; hookworm eggs when  $1\frac{1}{2}$  parts were added. Coccidia could be readily detected when either 1 part,  $1\frac{1}{2}$  parts or 3 parts of glycerin were added.

In our series of experiments we selected thirty-two samples of feces, most of which were found by the centrifugal method, previously described, to contain the ova of either ascarids, lungworms or hookworms. Some of these samples contained coccidia which were not recognized until the sample was submitted to Vajda's test.

One gram of each sample was placed in waxed cones, made by folding 110 mm. filter papers in the usual manner and dipping them in hot paraffin. We shall explain later our reason for the adoption of these "one service" receptacles, which is a deviation from the technique of Vajda. Water was then added and the mixture stirred with a toothpick, a different toothpick being used for each specimen, until it assumed the consistency of a diarrheal stool. Fox feces vary so much in consistency that it is impossible to give any constant degree of dilution. Three such preparations were made from each sample; and to the first 1 part, to the second  $1\frac{1}{2}$  parts, and to the third preparation 3 parts of glycerin B. P., sp. gr. 1.26, were added. The mixtures were again thoroughly stirred and allowed to stand for one-half hour before microscopic examination. At the end of this time a clean, dry, solid glass rod was gently brought in contact with the surface of the mixture, and the glycerin droplets transferred to slides for microscopic examination. Care must be taken not to go below the surface of the liquid. After recording our observations, the mixtures in all three cones were centrifuged at about 1,200 revolutions per minute for 15 minutes, and microscopic preparations made as before. In no case did we have to change our diagnosis after centrifuging, though the process did concentrate the eggs or oöcysts of coccidia, so that they could be seen in every microscopic field. Indeed, in cases of fairly heavy infestations, hundreds of ova of uncinaria would be seen in a tiny droplet.

In order to record our observations so that they would have

some comparative value it was necessary to decide upon a system of notation. H+ was taken to indicate that hookworm eggs were so few that they could be found only with difficulty; H++ meant that hookworm eggs were fairly evident; while H+++ was taken to show that the eggs were so numerous that groups of them could be found in each microscopic field. In the accompanying tabulation L stands for lungworm eggs, A for ascarid eggs and C for coccidia. To include all our readings for every dilution, before and after centrifuging the glycerin mixture, would be too complicated for a table. We will merely strike a fair average for all dilutions, and compare the results obtained by the centrifugal method with those of the method proposed by Vajda.

| Sample No. | Pepper's Centrifugal Method | Vajda's Method |
|------------|-----------------------------|----------------|
| 390        | H++                         | H+++           |
| 391        | L++                         | L+             |
| 392        | H+                          | H+++           |
| 393        | L+                          | L++            |
| 394        | H+, L++                     | H++, L++       |
| 395        | H+++ , L+                   | H++, L+        |
| 396        | Negative                    | C+             |
| 397        | H+                          | H++            |
| 398        | H+                          | H+++ , C+++    |
| 399        | H++                         | H+++           |
| 400        | C+                          | C++            |
| 401        | A+                          | A+++           |
| 402        | H+++ , L+++                 | H+++ , L+++    |
| 403        | Negative                    | L+             |
| 404        | "                           | H+             |
| 405        | H++                         | H+             |
| 406        | H++                         | H++            |
| 407        | H+                          | H+++           |
| 408        | H+, A+                      | H+++           |
| 409        | H+, A++                     | A++            |
| 410        | H+, L++                     | H+, L+         |
| 411        | H++ , A+                    | H+++ , A+, C++ |
| 412        | L+                          | H+, L+, A+     |
| 413        | Negative                    | H+             |
| 414        | "                           | H+             |
| 415        | "                           | H+             |
| 416        | L+++                        | L+++           |
| 417        | A+                          | Negative       |
| 418        | H+                          | H+             |
| 419        | L++                         | L++            |
| 420        | A+                          | A+             |
| 421        | A++                         | A++            |



The foregoing experiments seem to justify the unqualified conclusion that Vajda's method for the detection of the ova of the parasites mentioned is at least as accurate as the centrifugal method. The technique is so simple, especially with our suggested modification, that the work may be done in the field, which is an important consideration in making determination in a large group of animals. When present in any numbers the eggs are concentrated so that much time is saved in arriving at a diagnosis, since one has not to look through a mass of debris in the search for eggs. Especially when the material is centrifuged this method should also prove a valuable aid in experiments devised to determine the efficiency of anthelmintics.

We have adopted the waxed cones because of the possibility of eggs adhering to the sides of tubes and other glassware when glycerin is used. In making a large number of examinations, particularly in the field, it is not always possible to see to it that all glassware is properly cleansed. The use of individual receptacles removes this source of error.

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1. STILES, CH. WARDELL. Hookworm disease. Pub. Health Bul. 32.
2. VAJDA, THEODOR. A new method for detecting the eggs of parasites in feces. Jour. Amer. Vet. Med. Assoc., August, 1922, vol. 14 (n. s.), no. 5, p. 534.

#### LIVESTOCK IN RUSSIA

A heavy decrease in numbers of farm animals in Russia during recent years is shown in the following statistics issued by the Russian Liberation Committee:

|              | 1914       | 1922      |
|--------------|------------|-----------|
| Horses ..... | 22,000,000 | 8,000,000 |
| Cattle ..... | 18,000,000 | 6,000,000 |
| Sheep .....  | 4,500,000  | 2,000,000 |
| Swine .....  | 12,000,000 | 3,000,000 |

The Belgian Ministry of Agriculture has issued an order prohibiting the importation of ruminants from Argentina, Uruguay and Paraguay, because cattle from Buenos Aires have been found affected with foot-and-mouth disease on arrival at Antwerp, and because a large number of cattle of the same origin have been found affected with mange.

## SOME ATTEMPTS TO CONTROL STRONGYLES IN ANEURISMS BY MEANS OF INTRAVENOUS INJECTIONS OF DRUGS

By MAURICE C. HALL and JACOB E. SHILLINGER

U. S. Bureau of Animal Industry, Washington, D. C.

ANTHELMINTICS as used to remove worms from the lumen of the digestive tract constitute a very old group of drugs, but it is only in recent years that successful anthelmintic treatments have been developed for worms outside of the lumen of the digestive tract, and at the present time there are comparatively few treatments of the sort which can be regarded as established. So far the best results have been obtained in the control of certain fluke infestations, notably the control of the common liver fluke, *Fasciola hepatica*, by means of the oleoresin of male fern, and the control of the blood flukes belonging to the genus *Schistosomum* by means of tartar emetic and of emetin. The attempts to control tapeworm infestation in portions of the body outside of the lumen of the digestive tract have been much less successful, and while claims have been published as to the destruction of cysticerci and hydatids by means of anthelmintics, various experimenters have failed to substantiate these claims and at present we have no well-established treatments for the destruction of cestodes in cases of somatic tæniasis. Apparently, better results have been obtained in the control of somatic infestations with nematodes than with cestodes, though less has been accomplished than with trematodes. Evidence that appears satisfactory indicates that the destruction of the Guinea worm, *Dracunculus medinensis*, will follow the injection of tartar emetic or of novarsenobenzol. The evidence in regard to the destruction of *Loa loa* is less conclusive, and that in regard to the destruction of the common human filarid, *Filaria bancrofti*, is distinctly contradictory and unsatisfactory as yet.

The measure of success which has been attained in the control of these worms outside of the lumen of the digestive tract in recent years warrants a certain degree of optimism in regard to the prospects of developing satisfactory treatments for many

<sup>1</sup> Presented at the fifty-ninth annual meeting of the American Veterinary Medical Association, St. Louis, Mo., August 28 to September 1, 1922.

of these worm infestations. Prolonged experimentation is almost certain to yield positive results in time. While the results which we have to report are mostly of a negative character, so little is known at the present time that it seems worth while to add even a small amount of information on this subject.

One of the nematodes in the group under discussion which is of most interest to veterinarians is *Strongylus vulgaris*, the strongyle which in its larval and agamic stages is responsible for the formation of verminous aneurisms in horses, asses and mules, the aneurisms usually occurring in the anterior mesenteric artery and its branches. These aneurisms are believed to be responsible for certain types of verminous colic and of intermittent lameness, and may lead to the death of the infested animal as a result of rupture of the aneurism and consequent fatal internal hemorrhage. While we believe that the repeated routine use of the chenopodium treatment for the removal of the adult strongyles from the large intestine is a measure of great value in controlling these worms and diminishing the danger from infestation with larval and agamic forms, it appears that a treatment for the destruction of the worms in the blood vessels would be a useful supplementary measure in the control of these worms, and we have accordingly carried out the following experiments with a view to ascertaining something in regard to the effect on these worms of drugs injected intravenously.

Three horses were used in these experiments, two of them being given intravenous injections of tartar emetic only, and one being given intravenous injections of tartar emetic and one injection of carbon tetrachlorid. The usual procedure was employed of shaving the hair over the jugular vein on the left side, disinfecting the shaved area (we used 5 per cent carbolic acid), and slowly injecting by means of a small needle to avoid the danger of bad results from shock. The protocols of the experiments are as follows:

Horse No. 232, weighing 900 pounds, was given tartar emetic daily in doses of 2 grains each for 4 days, then 4-grain doses for the next 3 days, and then 6-grain doses for the next 13 days, the drug being given in as small an amount of sterile distilled water as would dissolve it. On postmortem examination we found in the anterior mesenteric artery an aneurism practically devoid of thrombus and containing on its walls only a very small amount of material resembling a thick serum, the lining being otherwise smooth. Two worms were present, 1 dead, partly disintegrated, and more or less

embedded in the wall, and 1 alive and free, or almost free, in the lumen of the vessel. Both worms were so immature that an exact identification could not be made, but they appeared to be *S. vulgaris*, the worm usually present in these aneurisms.

Horse No. 233, weighing 750 pounds, was given tartar emetic daily in doses of 6 grains each for 13 days. On postmortem examination we found in the anterior mesenteric artery an aneurism which, as in the previous case, was practically devoid of thrombus and contained on its walls only a small amount of thick serous material. The walls were less thickened than usual and showed little evidence of recent irritation. Eight small worms, probably *S. vulgaris*, were present, all of them being alive.

Horse No. 234, weighing 825 pounds, was given tartar emetic daily in doses of 10 grains each for 3 days, then 15-grain doses for 3 days, and then 20-grain doses for 3 days. The day of the last injection with tartar emetic this horse was given carbon tetrachlorid, using the pure, undiluted chemical. When 4 c.c. had been injected the animal showed evidence of discomfort and alarm. On the injection of 1 c.c. additional he exhibited marked symptoms of weakness, lack of control, and intoxication, the symptoms soon subsiding. On postmortem examination the next day we found in the anterior mesenteric artery an aneurism containing a small amount of fibrinous thrombus. Three worms, probably *S. vulgaris*, were present, two in the lumen and one in the wall, all of them being alive.

A consideration of the foregoing protocols shows that horse No. 232 received a total of 98 grains of tartar emetic distributed over a period of twenty days; horse No. 233 received a total of 78 grains over a period of thirteen days; horse No. 234 received a total of 135 grains over a period of nine days, and also received a total of 5 c.c. of carbon tetrachlorid in one dose. Live worms were found in all cases, and in only one case, that of horse No. 232, was a dead worm found. This horse received the largest number of treatments, though not the largest total amount of drug. It can not be determined on the evidence obtained whether the tartar emetic used in this case was responsible for the death of this worm. The presence of live worms argues against the ability of the drug to kill the worms, but the drug might be able to kill the worms at certain stages of development, as at molting, and not at other stages. A large number of treatments might then be more effective than large doses. Other worms present during the period of treatment may have been killed and disintegrated. We examined the veins of the cecum for evidence of such worms but failed to find any. The horses tolerated the tartar emetic in the doses

used, but the animal given carbon tetrachlorid reacted very unfavorably, and the drug, as might be expected, is probably dangerous when given intravenously. It would be of interest to ascertain its value in killing horses when injected intravenously. Chloroform given in this manner is sometimes highly effective, quickly killing the animal when injected in amounts as small as 10 c.c., but at other times large doses may be administered with only the result of putting the animal to sleep.

There appears to be practically nothing in the literature in regard to the effect of drugs on horse strongyles in aneurisms when injected intravenously. We have seen a casual reference in a commercial house organ to the efficacy of sodium cacodylate injected intravenously for palisade worms of horses, but nothing is given to indicate whether this is for worms in aneurisms or in the intestine, and there is no evidence furnished on which to judge the claim that the drug is valuable.

The fact that the aneurisms in the cases of two horses were practically devoid of thrombus suggested that tartar emetic might have a beneficial effect in diminishing the amount of thrombus present, a result which would be of value in clearing an obstruction from the circulation and in lessening the amount of material which might dislodge from time to time and lodge as emboli. However, there was a certain amount of thrombus present in the case of the third horse, and we occasionally find untreated horses with aneurisms practically devoid of thrombus. It would therefore be necessary to carry on a large number of experiments to establish the value of tartar emetic in diminishing the amount of thrombus present, and for the time being we would reserve judgment on this point.

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The Health Board of Lower Merion, Pa., has recently become associated with two neighboring boards in the employment of Dr. G. W. Grim, as milk control officer, at a salary of \$3,500 per year, according to the *American Journal of Public Health*.

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Dr. H. D. Martein, a practitioner in the city of Philadelphia for over 25 years, has been promoted from captain to major in the Veterinary Officers' Reserve Corps, and assigned to the 310th Field Artillery.



## GASTROENTERITIS IN SMALL ANIMALS

(Discussion on paper of O. V. Brumley, at fifty-ninth annual meeting of the American Veterinary Medical Association. See paper in JOURNAL for November, 1922, page 200.)

CHAIRMAN FLYNN: Gentlemen, you have listened to a very interesting and instructive paper, well prepared and well presented. This is a subject that should be of a great deal of interest to all the small-animal practitioners, and I trust you will take an active part in the discussing of this paper. We know that gastroenteritis covers possibly 60 to 75 per cent of the cases that are brought to the small-animal practitioners.

DR. QUITMAN: Gastroenteritis in some form or another is an all-frequent disease coming to the veterinary hospital of small animals. Dr. Brumley, in his most excellent paper, touches a little short, I think, on the way of treatment, and in enumerating some of the specific ailments that may be mistaken perhaps for an ordinary type of gastroenteritis. There should not be any mistake, but canine typhus should be mentioned for differentiating purposes. Typhus commonly starts with vomiting and all that, and it is, of course, a very gross error to diagnose a case of typhus as an ordinary case of gastroenteritis or gastritis.

In puppies that are weaned I find one of the most common causes of gastroenteritis is a bread and milk diet—that is, white bread. It is a well-known fact that a dog is a carnivorous animal, and he does not take care of starchy foods as well as does the herbivorous animal. Dogs two months old, three months old, four months old, are continually brought to the hospital suffering from gastritis or gastroenteritis perhaps, and oftentimes by sizing up this poorly developed condition you can name the cause to the owner without asking any questions. It is a common thing for me to say, "You have been feeding this pup on white bread and milk, haven't you?" And I find I hit the nail on the head nine times out of ten. Sooner or later, from that white bread not digesting, from fermentation of it, and the keeping up of continuous irritation, a gastritis or gastroenteritis will develop.

In the way of treatment I agree in part with that laid down by Dr. Brumley, but to a considerable extent I would digress there. I fully agree with him that we should use every endeavor to ascertain the cause, but sometimes that being impossible, I don't believe in treating the ultimate inflammatory condition of either stomach or bowels. Aside from where specific antidotes are required in the nature of chemical poisons, or when chemical poisons are the cause, the treatment can be pretty well unified and in many cases showing intense pain will cease almost instantly upon the performance, as suggested by Dr. Brumley, of a gastrointestinal douche, frequently washing out the intestines. However, that fails in many cases, or many cases are too weak to stand that. When the dog is in a very weak condition the gastrointestinal douche is somewhat dangerous to perform. In puppies under two months old it is not safe, so that soothing medicines of a somewhat anodyne character are indicated. In my own practice I use a mixture of a quarter minim of phenol and 5 to 7½ grains of bismuth subnitrate, about 7 to 7½ minims of opii camphorata for soothing effect, and glycerin and cinnamon water. I find that to be a very efficacious mixture. Sulphate of iron is recommended by Dr. Brumley, in a mild solution. It is just a little harsh; it is apt to induce emesis, and perhaps we have been expending our efforts to check the emesis which is exhausting the vitality of the patient.

DR. J. P. SCOTT: I would like to have Dr. Quitman tell us some of the differentiations between typhus and gastroenteritis.

DR. QUITMAN: I made the reference in discussing a certain matter several days ago that while fully acknowledging the value of the microscope for diagnostic purposes, I have tried to elaborate somewhat on the value of the "nosescope" for diagnostic purposes in veterinary practice, and that is the veterinarian's nose, a very important feature for diagnostic means. It helps us to diagnose many ailments or differentiate many ailments. For instance, a well-known authority made the statement that practically every case of mange can be positively diagnosed only by means of a microscope, and I took issue with him, saying that for one having a dog practice and having to stop and make a microscopic examination would seriously retard the wheels of progress of his business. I told him that many old practitioners at least called in the help of their noses to differentiate whether it was eczema or a case of mange. It is the same way with canine typhus. There are several distinguishing features. I want to tell you the nose is the most accurate and the quickest diagnostic method that I could recommend for telling canine typhus.

The breath of a canine typhus patient has a distinctive characteristic odor. It is different from the foul odor of a badly inflamed stomach or where there is fermenting and perhaps decomposed food material in the stomach. It is a difficult odor to describe, but the fact of the matter is there are, you might say, two odors in connection with typhus. The characteristic odor is an intensely foul sort of a knock-you-down odor, and it suggests in its character somewhat that of a cross between diseased bone and pulmonary gangrene, if you can picture that to your olfactory organs. In fact, it has almost got to be experienced to be understood.

Then, however, in some cases of the peracute type of typhus, that kind that gets sick and will die within twenty-four hours, that odor may not have had time to arise, but the odor in that case is oftentimes—well, again I am up against it for a description; but it is a sort of a cadaverous odor, if you can imagine a cadaver that has reached a point giving off an odor and an effort has been made to deodorize it with chlorid of lime, without the chlorid of lime odor predominating, however. That occurs only in the peracute cases, however, if they die of acute septicemia before any pathological changes have time to occur.

In differentiating from gastritis and gastroenteritis, aside from the odor, there is a very great and rapid depreciation that comes on in typhus. That you may have to get from the history. In typhus the patient becomes prostrated very much more rapidly than it will in gastritis or gastroenteritis. That is a very important feature for differential diagnosis. Then the typhus case very frequently assumes a sitting posture, whereas the gastroenteritis case is restless, moves around more, tumbles around more, or in the case of Collie pups they are more apt to have their feet up in the air, but restless, nevertheless. Also in a typhus case they frequently have a peculiar, far-away look in their eye that sometimes calls for differentiation between typhus and rabies. There are other differentiating symptoms, but I believe those are the most predominating ones.

DR. RICHARDSON: Does the age of the animal enter into the diagnosis at all?

DR. QUITMAN: To some extent, but the old animal sometimes has it from constipation.

DR. RICHARDSON: Did you ever see typhus in a pup?

DR. QUITMAN: I have seen it in dogs six months old.

DR. H. J. MILKS (Ithaca, N. Y.): I have a little to add perhaps to the paper on gastritis. There are two or three things in the treatment that we differ a little bit on. For instance, we find dogs

that won't hold any treatment for a time; they vomit as fast as you get it to them. We find an anti-emetic necessary very often in those cases. Sometimes in those cases of persistent vomiting I use a cocain solution.

There are some other diseases in regard to diagnosis that have not been considered. One is vomiting. We have run against that particularly in neuritis and jaundice and peritonitis. In fact, we have had a few cases brought to us as gastritis, and it was simply neuritis that caused the trouble.

In regard to food, I have for years figured that the big thing in gastritis was to rest the stomach. If you give the dog food and water, he simply takes it down and it comes back again. He will drink almost always, and almost always he will vomit. Keep the food away, and also keep the water away, and allow a few laps at a time, or put a piece of ice in a leaky dish so he can get a little that way, but not enough to make him vomit.

DR. HOWARD W. MILLER: Dr. Brumley, in his paper, speaks of a contagious condition in cats. We have had that in central Ohio to such an extent that outbreaks of it have pretty nearly cleaned out entire catteries. So far we have not had any good results from any treatment we have followed out. I would like to know, Dr. Quitman, if under those conditions they have devised anything that will work; and also in outbreaks of infectious jaundice in puppies, have they devised anything? We have been working along that line in Columbus. Dr. J. McI. Philip has used an arsenic injection with which he has obtained results. Sooner or later the results of those experiments will be put in the magazines.

DR. QUITMAN: I would like to ask the gentleman a question in regard to those cats. Aren't they cats that are fed almost entirely on liver?

DR. MILLER: No, I can't say that they are. They are cats that are fed all kinds of things, cat foods.

DR. QUITMAN: Do you mean young cats?

DR. MILLER: Cats of all ages, females and so on. Some of our hospitals have been infected to such an extent that nearly every cat that comes into the hospital for an operation will recover from the operation all right and five or six days afterwards develop yellow vomit and so on.

DR. QUITMAN: Have you made a pathological examination? I have seen gastroenteritis, or apparently gastroenteritis, and on close examination we find it resembles scurvy, but you don't get erosion of gums in cats when they are fed exclusively on a liver diet, and perhaps getting a little milk occasionally, and that little milk will simply retard the coming on of the symptoms. That will occur and infect any number of cats. It is the same way if they are fed exclusively on salmon or any fish; sooner or later I find they come down with this scurvy-like disease.

DR. MILLER: This isn't a scurvy disease.

DR. QUITMAN: I don't believe I can answer the doctor's question any more specifically, except to find out whether he was alluding to liver poison or salmon deficiency. I might say I alluded to feeding white bread and milk to dogs. Any number of the laity have the idea that a cat should be fed on nothing but liver. Sometimes when you reprimand them for that they say, "Doctor, I cook the liver sometimes." They couldn't change from liver to something else. But liver alone or liver with milk will not and does not seem to be a balanced ration for the cat. The addition of milk to the diet will retard the oncoming of the symptoms. If cats have liver alone from the time they are weaned, they usually show these symptoms inside of the time they are about two or three months old. If they get a little milk occasionally at all, it will be delayed until the cats are

six months old. If they get milk regularly daily in addition to the liver, they will wait until they get one year or two years old, but they will come down invariably. The same applies to an exclusive fish diet. I have had considerable numbers of similar cases to those alluded to by Dr. Brumley and Dr. Miller, and I have always found them to be of a dietetic origin invariably. Of course their cases may differ from the ones I have been dealing with.

CHAIRMAN FLYNN: I believe the point Dr. Miller is endeavoring to bring out is the same point I am confident the essayist had in mind when he presented that portion of his paper relating to infectious gastroenteritis of cats. It is indeed a very serious problem, and when it starts in a small-animal hospital you just practically can't bring a cat to the hospital for any kind of an operation, or it will contract it usually within three days' time after being exposed, and death follows anywhere from twelve hours to three or four days. Sometimes old cats will stand it, will go through, but kittens from four months to a year of age last usually about twenty-four hours after they start to vomit this yellow vomit.

DR. MILLER: That is the condition exactly. I know there have been times in some of our hospitals when orders have been given that no cats at all will be accepted at the hospital for a period of sixty days, so as to clean up this condition, but it will run along for a while and another animal will come in and in a day or two will develop this trouble, and the hospital is infected all over again. It is a very serious problem.

This condition of jaundice seems to come from an infection carried by a flea bite, and whole bunches of puppies will slip away from you in a day or two. In fact, they get away from you before you recognize the jaundice in them, with just a slight tinge of yellow in the mucous membrane, and they die like flies.

DR. MILKS: This cat disease is not confined to large cities; it is on farms and in homes; but it does hit the hospital, of course. We have been through it and have had a good many pathological examinations made, and the nearest we can get to the cause is the colon group. I don't know if that explains the cause or not. We get letters from farmers frequently asking, "What can we do to keep cats. Every time we get a cat it dies."

Just to show you how infectious it is, one man had a cat on his farm and it died. He then got a cat from town and put it on the same place, had a veterinarian castrate it; the cat died. The next time he went back and got another cat; he had someone else operate on it, and that cat died. He brought the second cat up for examination, and I told him not to put another cat in that house for some time. He thought the two cats died from the operation, and the next time he got one he didn't have it operated on, and it died within the same time as the others. It is a serious thing. The poultry farmers have quite a time with rats, and so have other farmers, and they can't keep cats because of this infection. In some cases it works very rapidly. It isn't a kennel disease, because we find it in Ithaca long before we get it in the cat ward. We find it in a certain part of the town where a cat has only been sick a while before it dies, and in a day or two we get a cat in and it dies, and almost invariably it comes from the same part of town.

DR. E. J. FRICK: I would like to add a few more words to what Dr. Milks has said, and back it up with a little history. Three years ago I was working in New York City. The Bide-A-Wee Home in New York City has four or five cages about the size of this room, and they collect stray cats from all over the city, and have people bring cats and leave them there until they can find a home for them. In that home it was a common sight to see in one big case fifteen or twenty cats in all stages of depression, some dead and others sick



unto death; some of them just mopy, and some that had been brought in within a few days and were perfectly well. The Bide-A-Wee Home does not use any methods of destroying the animals. The home was originated to collect cats and keep them there until a home could be found for them. They do not have to destroy them because in a few days they die, or if someone comes and gets a cat and takes it home, the cat dies in a short time. The S. P. C. A. and the New York Women's League for Animals in New York have practically the same conditions, except the cats are not kept in such a large cage and it is not so severe.

In Manhattan, Kans., at the State College, for two years they have not seen a case of infectious enteritis in cats. This spring a farmer brought a cat in and the cat died. The farmer had seven other cats on his farm; all seven died. The neighboring farmers lost their cats. We brought in a cat that was sick and we isolated a *B. coli* culture and gave the cat a bacterin, and that cat is running around the laboratory at the Kansas State College.

As far as curative means are concerned, I don't know what we can do unless it is a matter of experimenting and trying to find some serum or bacterin or vaccine or something along the biologic line to control it. We have tried medicinal preparations and the cats all seem to go.

DR. RICHARDSON: May I say just a few words along the lines of vaccination? I went through this same experience that Dr. Miller has mentioned. We could hardly take a cat into the hospital without losing it through infection of this gastroenteritis of cats. The clinicians tried for a long time to overcome this condition by changing diet, by disinfection, by excluding cats from the cat ward for some time, and finally we in the Pathological Division undertook to make a bacterin. We made a bacterin, and in cases in which it was used at the time the cat came into the hospital, immediately upon its receipt, we had very good results. We used it as a preventive entirely. We are not fortunate enough to use it in all cases, and in a great many cases where it wasn't used until the cat had been in a day or so, or where it wasn't used until after the animal was operated on, we didn't get any results. I think from what I have seen and from what little experience I have had that a bacterin can be relied upon very well as a preventive of this condition.

DR. C. H. ANTHONY: I believe a great deal of this gastroenteritis is caused not from the home feeding but from mouse poison and poison the cat gets in the alley. I have found if you feed a cat twice a day nothing but raw beef you will never have any trouble with your cat. Probably once a week give him a little cream, or milk containing cream. An ounce or two of cream will satisfy him. Then give cold water for the balance of his drink, and keep all fish, salmon and everything of that kind away from him if you want to keep him healthy.

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Dr. H. E. Biester has resigned his position with the University of Illinois and has returned to Ames to take a position in the Department of Research of the Veterinary School at Iowa State College.

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Dr. J. Raymond Wells has left Falls Church, Va., and is now engaged in the Division of Sanitation and Health of Beaumont, Tex., as dairy and meat inspector.



## CLINICAL AND CASE REPORT

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

### POTASSIUM NITRATE POISONING IN CHICKENS, WITH A NOTE ON ITS TOXICITY

By JOHN E. GUBERLET

*Parasitologist, Veterinary Department, Oklahoma Agricultural  
Experiment Station, Stillwater, Oklahoma*

ON the morning of June 7, 1922, the writer had occasion to observe a flock of chickens suffering from poisoning, the symptoms of which were first observed by the owner on the preceding evening. Upon arrival several birds were found dead and 35 or 40 others were seriously affected, of which some were prostrate and others comatose. Those that were in a serious condition had a severe diarrhea with marked diuresis. The droppings were watery and contained large amounts of urate materials. The combs and wattles ranged in color from dark red to purple, or even black. Respiration was disturbed. The sick birds displayed great thirst and, if at all able to stand, were drinking water or trying to do so. Almost the entire flock of 225 birds showed discolored combs and displayed a great desire for water. There was a marked diarrhea and diuresis in the whole flock. Most of the birds showed no other ill effects and were taking food.

After inquiring of the poultryman as to what had been fed to the birds on the preceding day it was learned that they had been given a dose of Epsom salts (magnesium sulphate). The "salts," according to the poultryman, were given at the rate of three-fourths pound per 100 birds. It had been dissolved in water which was used in mixing bran mash. This was taken fairly readily by the birds. The owner insisted that the "salts" could not be responsible for the trouble, as he had treated the flock similarly on former occasions from the same box of salt, but "they didn't eat it as readily before."

*Autopsy.*—Skin very dark, subcutaneous blood vessels congested, flesh dark pink to red, blood almost inky black. The

lungs in most cases were extremely free from blood, while in some of the others they were hepatized. Liver severely congested and almost black. The veins of the liver were much enlarged and gorged with blood clots, while the arteries were extremely contracted. The kidneys were decidedly enlarged and highly inflamed. Crop and proventriculus severely congested; congestion beneath the lining of gizzard; enteritis and congestion throughout the entire length of the intestine. The mesenteric blood vessels were gorged with blood.

Further inquiry as to where the salt was procured revealed the fact that this was a consignment which had been purchased "at a bargain." This particular lot had been wet at the drug store and had been on hand for some time. The poultryman bought it for Epsom salts. A sample was taken to the laboratory for examination where it was discovered that the "salts" were not magnesium sulphate, but potassium nitrate (saltpeter).

Later conversation with the poultryman disclosed the information that at former administrations the salt was dissolved in the drinking water and given in that way instead of in a mash. On those occasions the birds would not drink much of the water. That accounts for the fact that no trouble was experienced at former treatments.

About 25 of the birds died during the days of June 7, 8 and 9. Some of the birds that were nearly prostrate had recovered by the morning of June 8, except that they were very weak. Some of the affected individuals lingered for two or three days before they died, and death in those cases was due to acute enteritis and nephritis. The entire flock apparently suffered to some extent from enteritis and nephritis for several days. This condition, however, did not interfere to any great extent with the activity of the birds, except that they displayed an unusual thirst and showed a decrease in appetite. Egg production was reduced.

Little is known concerning the toxic effects of various drugs upon fowls. The most important work along this line is that of Gallagher (1919), who conducted a number of very valuable experiments on chickens to determine the toxicity of some of the more important and commonly used medicinal agents and of poisonous substances to which fowls not infrequently have access. Kaupp (1917) and others give the dosage for nearly all of the

common drugs used in the treatment of fowl diseases but say little concerning their toxicity.

Saltpeter poisoning in fowls is not of uncommon occurrence, although not on as large a scale as shown in this instance. This salt is an important constituent of certain fertilizers, and chickens have been poisoned from that source. Many people often use this salt in the preservation and curing of meats, and poisoning from this source some times accidentally occurs in fowls. It has been taken as a purgative by persons, being mistaken for magnesium sulphate (Holland, 1917, p. 218).

Potassium nitrate was formerly used rather extensively in medicine, as a diuretic, diaphoretic and febrifuge; also in acute cases of rheumatism. At present its use as a medicament is very limited, it being used principally as a local treatment.

Some experiments were conducted by the writer to determine what would be a toxic and a lethal dose of potassium nitrate for fowls. This was done because of the observance of such poisoning in a flock and on account of the interest this incident has incurred. Twenty birds, weighing 3 to 4½ pounds, were used in these experiments. Doses ranging from 1 to 90 grains were given by mouth and the results noted.

Very small doses, 1 to 2 grains, produced diuretic action with diarrhea in two to three hours provided water was near the birds constantly so that they could drink of it at any moment. This was especially true if the saltpeter was given in solution. In doses of 5 to 10 grains the same results were noted, except that the diarrhea and diuresis were more severe. Doses of 45 grains produced diuretic action in 40 to 45 minutes when the birds had constant access to water. Under these conditions doses containing 45 to 50 grains were toxic, and it required 80 to 90 grains for a lethal dose for fowls weighing 4 to 4½ pounds.

Chickens under range conditions, such as those in which the poisoning occurred, go considerable distances from their supply of water, and consequently can not drink at any moment they feel the desire. Therefore it seemed desirable that other experiments be conducted in which the birds would be given water about as often as they would drink under range conditions. Under this arrangement small doses produced no apparent external symptoms. Doses of 15 to 20 grains produced diarrhea and a diuretic condition after 2 or 3 hours, and then as a rule

only after the birds had taken water. Fowls taking 25 to 30 grains under these conditions showed toxic symptoms, while 60 grains was a lethal dose for a  $3\frac{1}{2}$  pound hen and 65 to 70 grains were fatal to birds weighing 4 to  $4\frac{1}{2}$  pounds.

Toxic doses of potassium nitrate produce symptoms of gastro-enteritis, nephritis, muscular weakness, slow, weak pulse, depression of the circulation, disturbed respiration and slight hemolysis of the blood. Along with these symptoms occurs the congestion of the peripheral blood vessels which results in the darkness of the skin and discolored comb. This is followed by a subnormal temperature, paralysis, collapse, and coma, followed by death. In nontoxic doses it causes diuresis and diarrhea. The toxic effect of the salt is lessened by keeping the system flushed with water. Therefore in the experiments the birds which consumed large quantities of water threw off from their systems a large amount of the poisonous substance. Birds which had been previously fed on a highly concentrated protein diet, whose excretory organs had already been taxed, suffered more acutely and showed more prominent symptoms than birds previously fed on a low protein diet.

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HOLLAND, JAMES W. 1917. Medical chemistry and toxicology. 5th ed., 683 pp. W. B. Saunders Co., Philadelphia.  
KAUPP, B. F. 1917. Poultry diseases. 2d ed., 245 pp. Amer. Vet. Pub. Co., Chicago.

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Dr. A. K. Merriman, formerly of Latham, Ill., is now located at Sullivan, Ill., where he has purchased the practice of Dr. W. C. Bateman.

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Dr. Joseph Hawkins, the oldest practitioner in the city of Detroit, has gone to California, where he will spend the winter with relatives.

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Dr. J. G. Jervis, of Milner, B. C., has been appointed lecturer in veterinary science at the University of British Columbia, to succeed Dr. T. H. Jagger, who resigned.

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Dr. A. W. Lehman has moved from Duncans, Vancouver Island, to Penticton, B. C.

## ABSTRACTS

EPIZOÖTIC LYMPHANGITIS. Brocq-Rousseu. Bul. Soc. Cent. Méd. Vét., Feb. 1922, p. 85. (Abst. in Rev. Gén. Méd. Vét., Sept. 15, 1922, vol. 31, p. 533.)

After long discussion as to the nature of the parasite of epizootic lymphangitis, it is generally admitted at the present time that the pathogenic agent is a fungus, *Cryptococcus farciminosus*. According to recent work of the author, this vegetable parasite possesses organs of reproduction of different kinds:

1. Conidian forms, spores of dissemination;
2. Forms of vegetation and conservation, external spores and chlamydospores;
3. A budding or encysted form, the cryptococcus as found in the lesions.

The arrangement and form of the conidia permit the placing of this fungus in the genus *Botrytis*. Numerous species of the genus *Botrytis* have been classified in the following groups: Oömycetes, Ascomycetes, Basidiomycetes; but the agent of epizootic lymphangitis could not be classified with certainty; all the attempts made in that respect have been without value, as they did not rest upon any precise fact.

It has been demonstrated that the conidian form develops best at a temperature of 20 to 25° C. This fact explains why lymphangitis exists in the endemic state in the warm countries of Northern Africa. There the fungus, under the form *Botrytis*, lives on natural media, such as straw, manure, etc., and the transfer of the spores to the affected animals is accomplished by the intermediary of insect carriers which are yet to be discovered.

The best method of finding the parasite in the lesions is to examine fresh preparations of pus without staining. With the usual stains, Ziehl or lactic blue, only the membrane of the envelope is stained; there is no elective staining. The examination of preparations of fresh pus does not permit the conclusion that only the cryptococcus is present; it is necessary always to obtain a culture. By this means there are found rather often the Priesz-Nocard microbe, streptococci, staphylococci, etc. The



prognosis of the affection varies in gravity according to whether the cryptococcus is alone or associated with other microbes.

What is the best remedy to use against well-defined epizootic lymphangitis not associated with other microbes? All the surgical methods and all the medicaments employed have resulted in cures.

According to experiments made in the army, the vaccine prepared by Boquet and Nègre has given the most cures. Of 246 animals treated there were 146 cures, or 59 per cent, and 38 showed improvement, a total of 184 cases (74 per cent) cured or well on the way to recovery. This vaccine therefore appears at the present time to be the preferable method for the treatment of epizootic lymphangitis. The only disadvantage of this treatment is the length of time that is sometimes required.

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CATS AND HUMAN DIPHTHERIA. W. G. Savage. *The Journal of Hygiene*, vol. 18 (1922), no. 4, p. 448.

Bacteriologic examinations were made of nose and throat of eight healthy cats and 12 kittens not associated with any cases of human diphtheria. In 3 of the cats no bacilli were found which might be taken for Klebs-Löffler organisms. In each of the 5 remaining cats there were recovered bacilli which showed an extremely close resemblance to diphtheria bacilli, but all of which were definitely not true diphtheria bacilli. All the 12 kittens failed to show any bacilli which at all resembled diphtheria bacilli. A study of 5 cats which were closely associated with diphtheria cases failed to show that any of the animals had diphtheria-like lesions and with the possible exception of one case, none of the cats harbored Klebs-Löffler bacilli. In the one case, organisms were found which resembled the diphtheria bacillus and agreed with it for the most part in cultural characteristics. However, a guinea-pig inoculated with a very heavy dose of culture was unaffected. In experiments with young kittens, it was found impossible to infect them by throat swabbing, although very massive doses were used. Kittens in whose throats an artificial nidus for local growth was provided by chemical or mechanical means failed to develop diphtheria or any local lesions when mixed cultures direct from human throats were used. Not only did the bacilli not infect, but they failed to survive, invariably disappearing

after as short a period as 24 hours. Attempts to infect the nasal cavities of kittens were all unsuccessful and all feeding experiments failed.

The author is of the opinion that the common and widely accepted view that cats can suffer from a naturally acquired disease caused by the diphtheria bacillus is entirely without foundation.

L. T. GILTNER.

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THE VITALITY OF TRICHINÆ IN AMERICAN BACON AND HAMS.  
Erick Süsskind. *Ztschr. Fleisch u. Milchhyg.*, June 15, 1922. (Abst. in *Rev. Gén. Méd. Vét.*, Sept. 15, 1922, vol. 31, p. 517.)

In order to obtain exact data on the dangers presented by hams and bacon of American origin, Süsskind conducted a series of experiments concerning the vitality of trichinæ. Fifteen guinea-pigs were fed with ham and bacon heavily infested with trichinæ and well salted. The number of trichinæ consumed by each guinea-pig varied between 9,900 and 27,902. On autopsy not a single trichina could be found in the musculature, although the muscles which are the preferred seat of trichina infestation were subjected to minutious microscopic examination.

The results prove that the trichinæ in heavily salted American hams are dead and harmless, even if their capsules do not show calcareous infiltration. None of the hams and bacon showed calcified trichinæ.

The author then studied the influence of sea salt on muscle trichinæ. Pieces of guinea-pig muscle 2 centimeters thick, containing trichinæ 6, 8 and 10 weeks old, were subjected to mild and strong curing, 5 and 10 grams respectively of sea salt being used for 100 grams of muscle. These pieces of muscle, refrigerated at a temperature of 3 to 4° C., were removed on the third, seventh, fourteenth, twenty-first, twenty-fifth, thirtieth and thirty-fifth days of curing and fed to guinea-pigs and mice. The strong curing destroyed the vitality of the trichinæ at the end of seven days. The mild curing required three weeks to destroy the vitality of the parasites.

The results prove that the use of sea salt is the method to be preferred for preventing the infestation of man by products of American origin.

GRASS DISEASE AND BOTULISM. J. B. Buxton. Vet. Jour., vol. 78 (1922), no. 562, p. 125. (Abst. in Expt. Sta. Rec., vol. 47, p. 186.)

This paper relates to a well-known disease of equines in certain parts of northern England and Scotland which was first investigated by a special committee in 1918. The symptoms of this affection appear to be identical with those of so-called forage poisoning of horses and cattle in the United States, and an organism indistinguishable from *Bacillus botulinus* was recovered by Tocher at Aberdeen early in 1919 from diseased portions of intestine and from the spleen of several cases of grass disease. The author's investigations which followed resulted in finding that the blood of several horses which had recovered from the affection contained traces of botulinus antitoxin, type A, and that its presence was undetectable in the blood of more than 40 normal horses which were similarly tested. It was found that such blood contained complement-binding antibodies for *B. botulinus*, and that these antibodies did not show the same specificity for the homologous type as did the antitoxin.

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THE PROBABLE IDENTITY OF THE CHITTENDEN-UNDERHILL PELLAGRA-LIKE SYNDROME IN DOGS, AND BLACKTONGUE. G. A. Wheeler, J. Goldberger and M. R. Blackstock. Pub. Health Rpts. (U. S.), vol. 37 (1922), no. 18, pp. 1063-1069. (Abst. in Expt. Sta. Rec., vol. 47, p. 285.)

Attention is called to the striking similarity between the black-tongue disease of dogs and the pellagra-like syndrome produced by Chittenden and Underhill in dogs by feeding a diet of boiled peas, cracker meal, and cottonseed oil. A review of the literature on blacktongue is given, together with postmortem findings in two cases. It is suggested that further investigation of this disease in dogs and a trial of the efficacy of a strictly dietary treatment are of importance on account of the probability that blacktongue in dogs may prove the analogue of pellagra in man.

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An advertiser in the Cooperstown (N. Y.) *Otsego Farmer* offers for sale "200 year old White Leghorns in laying condition." And the following advertisement appears in the New Haven (Conn.) *Register*: "For Sale—A 3-year-old female billie goat."

## REVIEW

CANINE DISTEMPER, ITS COMPLICATIONS, SEQUELÆ, AND TREATMENT. Hamilton Kirk, M. R. C. V. S., Fellow of the Royal Society of Medicine, Captain Royal Army Veterinary Corps. Published by Bailliere, Tindall & Cox, London, 1922. Price 10/6.

The first book dealing exclusively with the subject of canine distemper has just been published. It contains 226 pages, 28 text figures, and 1 plate, and covers exhaustively every detail concerning our present knowledge of this most prevalent disease of our canine friends. An indication of the subject matter treated is shown by the titles of the twelve chapters, which include the History; Susceptibility; Etiology; Bacteriological Notes; Predisposing Causes; Sources of Infection and their Practical Avoidance; Preventive Inoculation; Symptoms, Course, Progress and Mortality; Morbid Anatomy; Differential Diagnosis; Treatment and Convalescence. In addition there are an appendix and a bibliography.

Captain Kirk, who is a canine specialist, has presented the various etiological theories, discussed the latest suggestions of preventive inoculation, and in fact has covered all the various aspects of the subject in an unusually clear and readable form. It should therefore prove of value and assistance not only as a book of reference for the practitioner, but also as an interesting and understandable work for the student. As stated by the author, this disease has never received the consideration which no doubt would have been given it were it transmissible to human beings or food-producing animals, or were it associated with a heavy monetary loss to the country.

Both the author and the publishers are to be congratulated for the excellent manner in which they have performed their task; the illustrations are clear; the paper and binding are of good quality, and undoubtedly the book will shortly be found in the libraries of our leading veterinarians.

## ASSOCIATION NEWS

### AMERICAN VETERINARY MEDICAL ASSOCIATION

Proceedings of Fifty-ninth Annual Meeting, St. Louis, Mo.,  
August 28 to September 1, 1922

*(Continued from the November JOURNAL.)*

TUESDAY AFTERNOON, AUGUST 29, 1922

#### REPORT OF COMMITTEE ON BOVINE TUBERCULOSIS

PRESIDENT KINSLEY: Next will be the report of the International Committee on Bovine Tuberculosis, by Dr. Kiernan. (Dr. J. A. Kiernan read the report, which follows.)

Your committee pursued its studies of animal tuberculosis during the past year, stimulated at all times with an ambition to contribute some small particle of knowledge to supplement the classic report rendered to this Association at its forty-seventh annual meeting in 1910 by the first International Committee on Tuberculosis and the subsequent reports of high character made by the succeeding committees. All new information on the subject aids in the prosecution of the campaign for the eradication of tuberculosis of livestock which is being vigorously waged in the forty-eight States that comprise this Union, in the Dominion of Canada, also in the Republic of Mexico, which is taking a considerable interest in tuberculosis of livestock.

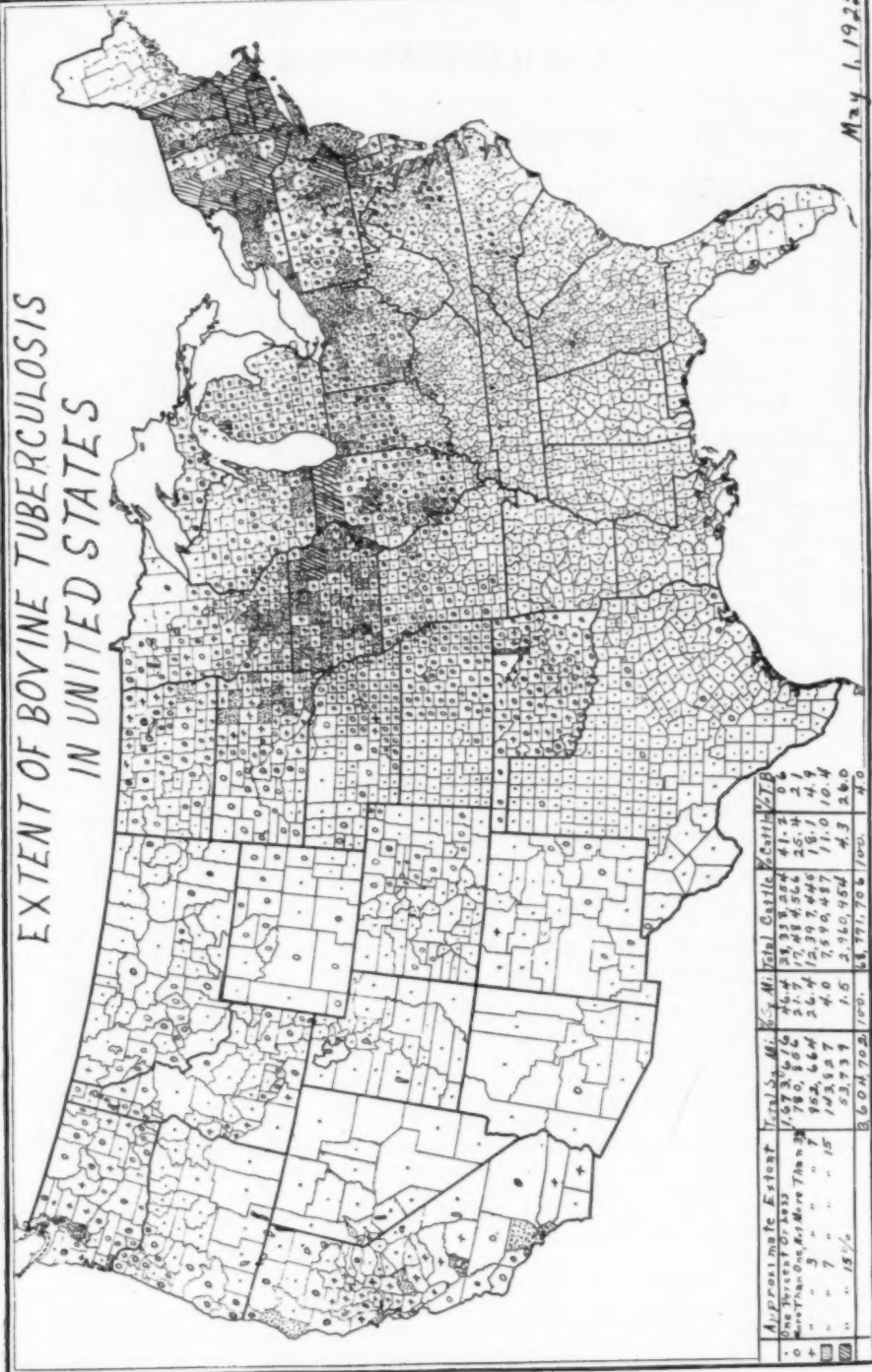
#### EXTENT OF BOVINE TUBERCULOSIS IN THE UNITED STATES

Your committee has made a thorough analysis of the information available, as a result of the cooperative campaign which has been in progress in the United States since 1917, for the purpose of reporting on the incidence of bovine tuberculosis in the respective States. We are now in a better position than at any previous period to indicate the extent of the disease in the various States. For five years there has been pursued with more or less vigor in the respective States a campaign which has for its objective the ultimate suppression of animal tuberculosis. That progress has been made during that period is quite evident, but of almost equal importance is the knowledge that has been acquired of the prevalence of the disease, its location and the extent of the infection. With this knowledge we are in a position today to take an inventory of the total healthy and total tuberculous cattle in every State. In consequence a fair outline may be made for a program which contemplates the eradication of the disease within the respective commonwealths.

The study made of the incidence of bovine tuberculosis shows that within 1,665,641 square miles in 37 States, and representing 46.2 per cent of the area of the United States not more than 1 per cent of the cattle are tuberculous. In that area, according to the census of January 1, 1920, there were 28,307,648 cattle, representing 41.2 per cent of the total cattle of the United States. To recapitulate, in 46.2 per cent of the area of the United States having 41.2 per cent of all the cattle, bovine tuberculosis exists to not more than 1 per cent,



# EXTENT OF BOVINE TUBERCULOSIS IN UNITED STATES



and in many parts of that vast area the disease exists to a degree considerably less than 1 per cent. The livestock owners of those States have expressed themselves in language which can not be misunderstood that bovine tuberculosis shall be eradicated from their herds and that infection must be prohibited from being introduced. They favor the rigid enforcement of regulations requiring the proper inspection and tuberculin testing of herds—not merely individual animals but herds from which individual animals are shipped interstate. The owners in those States have such a strong antipathy toward tuberculosis and are so actively engaged in its suppression that probably within ten years the disease will be either entirely eradicated or reduced to a minimum.

The accompanying map and table show the per cent of bovine tuberculosis as it exists in the various States.

EXTENT OF BOVINE TUBERCULOSIS, May 1, 1922

| Approximate Extent<br>of Bovine<br>Tuberculosis | Total<br>Square<br>Miles | Per Cent<br>of Total<br>Area | Total Num-<br>ber Cattle<br>Jan. 1, 1920 | Per Cent<br>of Total<br>Cattle | Per Cent<br>Tuberculous<br>Cattle |
|---|--------------------------|------------------------------|--|--------------------------------|-----------------------------------|
| Not more than 1 per cent . . .                  | 1,665,641                | 46.2                         | 28,307,648                               | 41.2                           | 0.6                               |
| Over 1 and under 3 per cent. .                  | 763,979                  | 21.2                         | 16,828,916                               | 24.5                           | 2.1                               |
| Over 3 and under 7 per cent. .                  | 965,705                  | 26.8                         | 12,196,003                               | 17.7                           | 4.9                               |
| Over 7 and under 15 per cent. .                 | 155,638                  | 4.3                          | 8,478,185                                | 12.3                           | 10.3                              |
| Over 15 per cent. . . . .                       | 53,739                   | 1.5                          | 2,960,954                                | 4.3                            | 26.0                              |
| Total (United States) . . . . .                 | 3,604,702                | 100.0                        | 68,771,706                               | 100.0                          | 4.0                               |

The committee is of the opinion that the livestock interests of the country are desirous of obtaining some idea of the extent of the job that has been undertaken. They have been patient in waiting for data on the subject, as indicated by the numerous requests that have been received for information as to the probable number of tuberculous cattle in the country and the approximate cost of suppressing the disease. The map furnishes the best information available as to the extent of the disease. This information was obtained from the livestock sanitary authorities of the various States and the Bureau of Animal Industry representatives cooperating within the respective commonwealths.

Since the inauguration of the cooperative campaign in 1917 much has been done educationally to convince cattle owners that tuberculosis may be eradicated from a herd or from groups of herds through the various methods of tuberculin testing, followed by proper sanitary precautions to prevent reinfection and by eternal vigilance of owners in keeping animals of unknown health away from their herds. That the educational feature of the work has produced results is shown by the very general knowledge of the subject possessed by livestock owners. The accredited-herd plan and the area plan of eradicating tuberculosis are quite well known in livestock circles in all parts of the country. This in itself is a matter that is worthy of considerable consideration—that this information has been disseminated so widely in such a comparatively short time.

We feel confident that inasmuch as it has been demonstrated to the satisfaction of the livestock owners of the United States that bovine tuberculosis may be eradicated from an individual herd or a group of herds or all the herds within a circumscribed area, this campaign inaugurated on a cooperative basis in 1917 will not be abandoned until the disease is entirely controlled. By control we mean that it shall not only cease to be a menace to the livestock industry of this nation but in addition that it shall be suppressed entirely by one means or another within the areas in which it exists to such an extensive degree.

For more than ten years the crystallization of public opinion against the shipment of tuberculous cattle interstate, for purposes other than immediate slaughter, has been making its impression on the livestock owners where the disease exists. True, the impression came slowly and was accomplished at times only through economic coercion, but happily the impression was so indelibly implanted that there are but few, if any, who now attempt to ship tuberculous cattle under the guise of healthy animals. The dairymen of Nevada or Arizona or Florida who contemplate purchasing improved cattle look up the record of the State, the county and the herd from which they consider the acquisition of the animals. They want to know not only that the individual cows they buy have been tuberculin tested, but that the entire herd out of which they purchase is under supervision and that its health has been demonstrated so far as it is possible to reveal the true conditions.

#### PROGRESS IN TUBERCULOSIS ERADICATION

It is expected that eradication of tuberculosis will go on with ever-increasing rapidity until the disease becomes circumscribed within the badly infected areas. Then eradication in those areas must be conducted vigorously, otherwise the disease will mean tremendous financial loss to the livestock owners. There is no endeavor to picture an optimistic perspective of the future and acclaim the harmonious progress of tuberculosis work to its ultimate consummation. The views expressed are only those consistent with the history of the suppression of infectious diseases of livestock within this country. Tuberculosis challenged the indomitable will of the livestock owners of America, and they in their characteristic militant way accepted the challenge and are making headway against the enemy and will win as they were victorious in their campaigns against pleuropneumonia, foot-and-mouth disease and the various other diseases attacked by them.

Substantial progress has been made in several of the States in the suppression of tuberculosis. The elimination of the disease from all of the herds within entire counties or other units of territory is being conducted in approximately 150 counties, and the tendency seems to be at the present time for an expansion of this system of carrying on the campaign.

As indicated previously in this report, it is not unreasonable to expect that within a few years tuberculosis will have been practically exterminated in a number of States where the infection is comparatively slight. This will enable the concentration of forces in States where the problem is of greater magnitude, and with the continued support of the livestock industry inroads can be made upon the infected herds and gradually they can be converted by the elimination of the diseased animals and the building up of sound herds.

The task is no less a tremendous one now than it was in 1917, but time has revealed the extent of tuberculosis in the respective States and this stands out now in contrast with the obscurity of the facts as they existed several years ago. This immense campaign now in progress contemplates the suppression of tuberculosis. The whole structure is founded on the established fact that the disease can be eradicated in the individual herd and among groups of herds of cattle. In order that the campaign shall endure until the aims are accomplished, we must pledge our faith to the principle that the methods known and practiced, although not perfect by any means, will accomplish the eradication of animal tuberculosis. Time and practice will evolve better methods and a more perfect system that will aid in the campaign. No evolution or any degree of perfection can be accomplished if we cease our efforts and wait for the millennium

to come. All is not perfection in the cooperative plan of eradicating tuberculosis of livestock. It is just a plan developed by practice during the course of many years and will undergo whatever further changes practice and experience show to be necessary.

A summary of tuberculosis eradication work for five years and the status of this work June 30, 1922, are given in the accompanying tables.

SUMMARY OF TUBERCULOSIS ERADICATION WORK IN COOPERATION WITH THE VARIOUS STATES,  
FISCAL YEARS 1917-1922

| States                      | Cattle Tested | Reactors Found | Per cent Reacted | Number Counties Doing Area Work June 30, 1922 |
|-----------------------------|---------------|----------------|------------------|---|
| Alabama                     | 79,140        | 1,118          | 1.4              | 8   |
| Arkansas                    | 6,564         | 103            | 1.6              |   |
| California                  | 4,867         | 146            | 3.0              | 2   |
| Colorado                    | 2,027         | 76             | 3.8              |   |
| Connecticut                 | 38,746        | 5,884          | 15.2             |   |
| Delaware                    | 22,306        | 2,455          | 11.0             |   |
| District of Columbia        | 6,403         | 72             | 1.1              |   |
| Florida                     | 65,543        | 1,519          | 2.3              |   |
| Georgia                     | 56,782        | 1,067          | 1.9              | 40  |
| Idaho                       | 78,388        | 1,244          | 1.6              | 26  |
| Illinois                    | 114,882       | 7,420          | 6.5              | 5   |
| Indiana                     | 183,010       | 5,412          | 3.0              | 5   |
| Iowa                        | 210,349       | 12,821         | 6.1              | 33  |
| Kansas                      | 79,450        | 2,101          | 2.6              | 2   |
| Kentucky                    | 85,963        | 2,052          | 2.4              | 33  |
| Louisiana                   | 40,960        | 1,125          | 2.7              | 4   |
| Maine                       | 84,324        | 2,122          | 2.5              | 15  |
| Maryland                    | 83,338        | 6,760          | 8.0              | 4   |
| Massachusetts               | 30,381        | 2,549          | 8.4              |   |
| Michigan                    | 230,083       | 7,460          | 3.2              | 18  |
| Minnesota                   | 275,810       | 8,206          | 3.0              |   |
| Mississippi                 | 107,416       | 550            | 0.5              | 4   |
| Missouri                    | 265,634       | 3,279          | 1.2              | 22  |
| Montana                     | 210,469       | 3,738          | 1.8              | 6   |
| Nebraska                    | 199,950       | 6,206          | 3.1              | 20  |
| Nevada                      | 31,664        | 1,140          | 3.6              | 10  |
| New Hampshire               | 23,704        | 2,415          | 10.2             | 1   |
| New Jersey                  | 39,443        | 2,895          | 7.3              |   |
| New Mexico                  | 7,338         | 70             | 1.0              | 8   |
| New York                    | 218,646       | 28,623         | 13.1             | 27  |
| North Carolina              | 103,369       | 1,455          | 1.4              | 45  |
| North Dakota                | 160,652       | 4,928          | 2.9              | 8   |
| Ohio                        | 115,182       | 5,219          | 4.5              |   |
| Oklahoma                    | 79,991        | 2,698          | 3.4              |   |
| Oregon                      | 149,086       | 2,997          | 2.0              | 36  |
| Pennsylvania                | 123,715       | 7,279          | 5.9              | 1   |
| Rhode Island                | 4,151         | 370            | 8.9              |   |
| South Carolina              | 49,080        | 806            | 1.6              | 31  |
| South Dakota                | 50,167        | 2,684          | 5.4              | 4   |
| Tennessee                   | 98,167        | 1,076          | 1.1              | 3   |
| Texas                       | 70,259        | 1,314          | 1.9              |   |
| Utah                        | 64,883        | 637            | 1.0              | 12  |
| Vermont                     | 183,254       | 12,719         | 6.9              | 4   |
| Virginia                    | 156,882       | 4,632          | 3.0              | 3   |
| Washington                  | 186,589       | 4,682          | 2.5              | 20  |
| West Virginia               | 43,654        | 916            | 2.1              | 6   |
| Wisconsin                   | 357,911       | 10,076         | 2.8              | 17  |
| Wyoming                     | 35,781        | 370            | 1.0              | 11  |
| Indian Schools <sup>1</sup> | 413           | 27             | 6.5              |   |
| Purebred U. S. <sup>1</sup> | 4,486         | 157            | 6.5              |   |
| Total                       | 4,931,252     | 185,670        | 3.8              | 494   |

<sup>1</sup> 1917

STATUS OF TUBERCULOSIS ERADICATION WORK IN COOPERATION WITH VARIOUS STATES,  
JUNE 30, 1922

| States                    | Once Tested, Free |           | Accredited |         | Under Supervision |           |
|---------------------------|-------------------|-----------|------------|---------|-------------------|-----------|
|                           | Herds             | Cattle    | Herds      | Cattle  | Herds             | Cattle    |
| Alabama.....              | 735               | 17,444    | 79         | 3,458   | 837               | 26,344    |
| Arkansas.....             | 39                | 845       | 35         | 1,084   | 81                | 2,000     |
| California.....           | 129               | 1,370     | 0          | 0       | 173               | 4,676     |
| Colorado.....             | 7                 | 269       | 1          | 37      | 18                | 759       |
| Connecticut.....          | 475               | 8,613     | 83         | 2,180   | 813               | 18,189    |
| Delaware.....             | 1,120             | 4,690     | 125        | 1,470   | 1,825             | 9,625     |
| District of Columbia..... | 141               | 345       | 194        | 815     | 340               | 1,373     |
| Florida.....              | 3,133             | 23,865    | 88         | 3,113   | 4,014             | 44,761    |
| Georgia.....              | 1,812             | 26,523    | 21         | 1,558   | 2,006             | 36,242    |
| Idaho.....                | 5,056             | 40,454    | 116        | 4,031   | 5,607             | 51,371    |
| Illinois.....             | 709               | 12,740    | 368        | 8,589   | 3,449             | 44,452    |
| Indiana.....              | 8,970             | 62,290    | 1,308      | 22,326  | 11,753            | 109,557   |
| Iowa.....                 | 3,500             | 51,690    | 779        | 23,649  | 5,757             | 113,797   |
| Kansas.....               | 395               | 10,500    | 388        | 11,800  | 1,000             | 32,053    |
| Kentucky.....             | 5,347             | 41,273    | 194        | 5,500   | 6,781             | 57,251    |
| Louisiana.....            | 516               | 11,542    | 63         | 2,681   | 591               | 17,023    |
| Maine.....                | 6,748             | 56,203    | 523        | 6,413   | 8,555             | 71,726    |
| Maryland.....             | 1,632             | 16,698    | 386        | 7,572   | 3,455             | 34,043    |
| Massachusetts.....        | 68                | 1,930     | 61         | 2,350   | 216               | 7,084     |
| Michigan.....             | 13,496            | 113,519   | 385        | 7,642   | 16,727            | 149,711   |
| Minnesota.....            | 2,022             | 38,759    | 1,506      | 34,833  | 4,222             | 91,872    |
| Mississippi.....          | 352               | 11,026    | 140        | 3,241   | 674               | 15,933    |
| Missouri.....             | 18,703            | 177,465   | 389        | 12,400  | 19,734            | 205,792   |
| Montana.....              | 9,914             | 126,466   | 116        | 6,358   | 10,845            | 159,851   |
| Nebraska.....             | 7,728             | 95,390    | 210        | 5,877   | 9,769             | 134,692   |
| Nevada.....               | 1,517             | 8,873     | 7          | 882     | 1,884             | 18,612    |
| New Hampshire.....        | 485               | 5,111     | 65         | 1,717   | 779               | 12,145    |
| New Jersey.....           | 112               | 1,693     | 73         | 2,007   | 293               | 8,304     |
| New Mexico.....           | 724               | 5,575     | .....      | .....   | 883               | 6,827     |
| New York.....             | 4,511             | 53,615    | 365        | 12,380  | 6,543             | 196,560   |
| North Carolina.....       | 20,988            | 81,545    | 277        | 5,604   | 21,652            | 87,463    |
| North Dakota.....         | 3,593             | 63,037    | 721        | 15,962  | 5,357             | 105,058   |
| Ohio.....                 | 1,523             | 17,774    | 848        | 15,416  | 2,802             | 46,118    |
| Oklahoma.....             | 391               | 9,327     | 182        | 6,334   | 1,151             | 23,421    |
| Oregon.....               | 9,163             | 90,987    | 170        | 4,144   | 9,333             | 95,131    |
| Pennsylvania.....         | 1,039             | 14,598    | 1,165      | 19,501  | 3,005             | 49,454    |
| Rhode Island.....         | 17                | 544       | 14         | 304     | 42                | 1,213     |
| South Carolina.....       | 882               | 10,875    | 80         | 2,639   | 1,765             | 17,209    |
| South Dakota.....         | 293               | 7,600     | 218        | 4,733   | 610               | 15,452    |
| Tennessee.....            | 669               | 13,020    | 198        | 7,623   | 6,164             | 94,072    |
| Texas.....                | 46                | 1,714     | 66         | 2,211   | 231               | 16,386    |
| Utah.....                 | 6,238             | 21,994    | 77         | 2,457   | 6,855             | 42,763    |
| Vermont.....              | 2,460             | 35,573    | 1,165      | 17,675  | 4,440             | 65,415    |
| Virginia.....             | 1,300             | 14,407    | 675        | 15,792  | 2,410             | 42,599    |
| Washington.....           | 5,687             | 43,869    | 111        | 2,871   | 6,166             | 52,829    |
| West Virginia.....        | 2,029             | 17,337    | 224        | 4,828   | 2,426             | 26,475    |
| Wisconsin.....            | 2,345             | 49,505    | 1,754      | 39,735  | 5,066             | 120,477   |
| Wyoming.....              | 2,774             | 27,701    | 3          | 110     | 3,083             | 32,235    |
| Total.....                | 161,533           | 1,548,183 | 16,216     | 363,902 | 212,182           | 2,616,395 |

TUBERCULOSIS ERADICATION HELPS RATHER THAN HINDERS MILK  
PRODUCTION

From July 1, 1917, to June 30, 1922, there were destroyed 175,000 tuberculous cattle. It was believed by some when the campaign began that the destruction of so many cattle would cause a shortage of dairy products and that the publicity given to the campaign would cause such alarm among the consumers of dairy products that it would work a great injury to the dairy industry. But instead of producing those results the increasing efforts to improve the health of herds have inspired more faith in the safety and value of foods from the dairy cows. Within the last four years several hundred towns have issued regulations requiring the tuberculin testing of dairy cows. On June 10, 1922, it was reported by the United States Department of Agriculture that the production of milk during 1921 was estimated at 98,862,276,000 pounds, a gain over 1920. The aver-



age per capita consumption of milk during that year was 49 gallons, the largest consumption on record. The number of milk cows increased during that year compared with 1920. Also the production of butter increased during the same period. Milk cows on farms increased 341,000 head during 1921.

#### THE CONTROL OF BOVINE TUBERCULOSIS FROM A PUBLIC HEALTH STANDPOINT

The Committee on Tuberculosis in the past has not undertaken to report data concerning the transmissibility of bovine tuberculosis to the human family, for the reason that it is generally accepted that this is a question that should be left to the medical profession and that our profession should confine itself to the study and control of diseases of livestock and the dissemination of knowledge pertaining to the health of livestock as an economic problem.

The serious study and investigation of bovine tuberculosis as a public health question was stimulated by the activity of those who questioned the statements of the late Dr. Robert Koch that the danger to man from bovine tuberculosis was negligible. Observations made since that time have established more firmly than ever that the transmission of the bovine type of tuberculosis to man is not uncommon and that at least 10 per cent (Park) of the deaths from tuberculosis in children under five years of age are the result of infection of bovine origin.

The guarding of public health against such sources of infection becomes a public duty and justifies this Association and the veterinary profession in using every honorable means in order that there may be a more general recognition of this question from a public health standpoint.

It is not uncommon to hear that representatives of local health departments and locally prominent members of the medical profession have made statements that the danger of transmission of bovine tuberculosis to the human family is negligible. There still continues to be more or less indifference to this problem on the part of some of the public health officials. As the source of bovine infection to the human family is largely confined to the milk, milk products and meats, a supervision of the production, handling and distribution of these products constitutes an important public health service, and no organized effort or campaign for the control and suppression of human tuberculosis is logical that does not include measures to control bovine tuberculosis. Large sums of money are expended annually for sanatoria to care for individuals with tuberculosis, and larger sums will have to be appropriated for many years to come unless measures are adopted to prevent the infection of new individuals. Certain scientists, health service organizations and commercial dealers in milk and milk products attempt to solve the problem by pasteurization. If pasteurization under rigid regulatory inspection forces could be universally applied, no doubt it would be effective. But it is impossible to obtain that kind of pasteurization except in a few of the larger cities where the inspection service is rigid and complete. Unless milk and cream are properly pasteurized it simply sets up a false standard of security to the public. The larger percentage of our population living on the farms and in the smaller communities must continue to use raw milk and milk products. Proper pasteurization will never become general, nor will it solve the control and elimination of the bovine source of infection to the human family.

The members of this Association should interest themselves in educational campaigns on the relation of animal tuberculosis to the public health. It is not our duty to do educational work pertaining to public health, but we should be in a position to furnish health

authorities with such information as will assist and stimulate them to reach the public through educational institutions, the public press, medical colleges, bulletins and other channels. For these reasons and with the above object in view your committee submits a résumé of certain literature on the transmissibility of bovine tuberculosis to the human family.

*Résumé of Literature on the Transmissibility of Bovine Tuberculosis to the Human Family*

Park and Krumweide (1)<sup>1</sup> examined 487 cases of tuberculosis to determine the type of bacillus present and recorded 1,033 cases found in the literature, making a total of 1,520 cases. Nine hundred and fifty-five were adults over 16 years of age, 177 were children from 5 to 16 years of age, and 368 were children under 5 years. The bovine type of the bacillus was found present in 35 per cent of the children from 5 to 16 years of age, and in 26 per cent under 5 years. Both the human and bovine types were found in eleven additional cases examined. Examinations made at a foundling asylum on 9 cases in children under 6 years of age, who were fed on cow's milk, showed 5, or over 50 per cent, to be infected with the bovine type. The bovine type was found to be present in 12½ per cent of the fatal cases of tuberculosis in children under 5 years of age in New York City.

Dr. W. H. Park (2) in a later article, as a result of studies of 1,042 cases, drew the following conclusions:

"As the result of a large series of cases reported by ourselves and others, it has been shown:

"1. That children are especially infected and usually the point of entry is the alimentary tract.

"2. That cervical adenitis and abdominal tuberculosis are the most frequent types of infection.

"3. That generalized tuberculosis due to bovine tuberculosis is less frequent.

"4. That bone and joint tuberculosis is most commonly of the human type.

"5. That the meninges are less commonly affected by the bovine than by the human type.

"6. That the infection of adults by bovine bacilli is very infrequent.

"7. That pulmonary tuberculosis due to bacilli of the bovine type is rare."

Park sums up his data in the following two tables:

TABLE 1.—PERCENTAGE OF BOVINE INFECTION<sup>1</sup>

| Diagnosis   | Adults<br>16 years<br>and over | Children<br>5 to 16<br>years | Children<br>under 5<br>years |
|---|--------------------------------|------------------------------|------------------------------|
|   | <i>per cent</i>                | <i>per cent</i>              | <i>per cent</i>              |
| Pulmonary tuberculosis.....   | 0 <sup>2</sup>                 | 0                            | 0                            |
| Tuberculosis adenitis, cervical.....                                | 4                              | 37                           | 57                           |
| Abdominal tuberculosis.....   | 16                             | 50                           | 68                           |
| Generalized tuberculosis.....                                       | 3                              | 40                           | 26                           |
| Tubercular meningitis (with or without generalized<br>lesions)..... | 0                              | 0                            | 15                           |
| Tuberculosis of bones and joints.....                               | 5                              | 3                            | 0                            |
| Total number of cases studied.....                                  | 686                            | 132                          | 220                          |

<sup>1</sup> Exclusive of the cases of double infections. In considering the pulmonary cases it must be remembered, however, that bovine tubercle bacilli have been isolated from the lung in cases of generalized tuberculosis in children.

<sup>2</sup> If one doubtful case admitted, 0.2 per cent.

Grand total studies..... 1,042  
Total infected with mixed or double infection..... 4

<sup>3</sup> Figures in parentheses following authors' names refer to list of literature at end of report.

Table 2 shows the importance of bovine infection in those forms of tuberculosis in children which are of great severity.

TABLE 2.—PERCENTAGE OF BOVINE INFECTION (REVISED)

| Diagnosis  | Children 5 to 16 Years |                       | Children Under 5 Years |                       |
|--|------------------------|-----------------------|------------------------|-----------------------|
|  | Combined Figures       | Own Figures           | Combined Figures       | Own Figures           |
| Abdominal tuberculosis.....  | <i>per cent</i><br>66  | <i>per cent</i><br>50 | <i>per cent</i><br>69  | <i>per cent</i><br>75 |
| Generalized tuberculosis, alimentary origin.....                         | 60                     | .....                 | 48                     | 66                    |
| Generalized tuberculosis.....  | 20                     | .....                 | 11                     | 18                    |
| Tubercular meningitis, secondary to tuberculosis of alimentary type..... | .....                  | .....                 | 72                     | .....                 |
| Tubercular meningitis (other than preceding).....                        | .....                  | .....                 | 6                      | 5½                    |

Park concludes as follows: "A careful study of all the factors leads us to estimate that about 10 per cent of all deaths caused by tuberculosis in children under five years of age is due to bovine infection when the milk is not pasteurized."

Dr. A. Philip Mitchell (3) of Edinburgh reports the examination of 72 cases of cervical gland tuberculosis in the Children's Hospital in Edinburgh and found tubercle bacilli of the bovine type in 65 cases, or 90 per cent. (Cattle in the vicinity of Edinburgh are very highly infected with tuberculosis.)

The British Royal Commission (4) announced in 1911 the following: "There can be no doubt that a considerable portion of tuberculosis affecting children is of the bovine type, most particularly that which affects primarily the abdominal organs and the cervical glands." Of 108 cases of tuberculosis examined by this commission, the bovine type was present in 24, or 22 per cent, of the cases.

The British Royal Commission, Second Interim Report (5), states the following conclusion:

"We may briefly sum up the bearings of the result at which we have already arrived, as follows:

"There can be no doubt but that in a certain number of cases the tuberculosis occurring in the human subject, especially in children, is the direct result of the introduction of the bacillus of bovine tuberculosis into the human body; and there also can be no doubt that in a majority at least of these cases the bacillus is introduced through cows' milk. Milk containing bovine tubercle bacilli is clearly a cause of tuberculosis and of fatal tuberculosis in man.

"Of the 60 cases of human tuberculosis investigated by us, 14 of the viruses belonged to Group 1—that is to say, contained the bovine bacillus. If, instead of taking all these 60 cases, we confine ourselves to cases of tuberculosis in which the bacilli were apparently introduced into the body by way of the alimentary canal, the proportion of Group 1 becomes very much larger. Of the total 60 cases investigated by us, 28 possessed clinical histories indicating that in them the bacillus was introduced through the alimentary canal. Of these, 13 belong to Group 1. Of the 9 cases in which the cervical glands were studied by us, 3; and of the 19 cases in which the lesions of abdominal tuberculosis were studied by us, 10 belong to Group 1.

"These facts indicate that a very large proportion of tuberculosis contracted by ingestion is due to tubercle bacilli of bovine source.

"A very considerable amount of disease and loss of life, especially among the young, must be attributed to the consumption of cows' milk containing tubercle bacilli. The presence of tubercle bacilli in

cows' milk can be detected, though with some difficulty, if the proper means be adopted, and such milk ought never be used as food. There is far less difficulty in recognizing clinically that a cow is distinctly suffering from tuberculosis, in which case she may be yielding tuberculous milk. The milk coming from such a cow ought not to form part of human food, and indeed ought not to be used as food at all.

"Our results clearly point to the necessity of measures more stringent than those at present enforced, being taken to prevent the sale or the consumption of such milk."

British Royal Commission (6). Excerpt from Third Interim Report:

"Tuberculosis involving the udder is comparatively common in cows, and in such cases their milk always contains tubercle bacilli and is, therefore, dangerous for human beings consuming it. It was, however, undecided what is the danger, if any, attaching to the milk of tuberculous cows in which the udder presents no evidence of the disease. We, therefore, took the opportunity of making a number of observations and experiments bearing on this point. The experiments were made with the milk of cows which had contracted the disease in the natural way. In natural tuberculosis in the cow, cases which show such obvious symptoms of the disease as emaciation and cough, should be considered separately from the cases in which there are no such signs and in which the disease is to be recognized during life only by means of the injection of tuberculin.

"None of the cows investigated showed any sign of disease of the udder during life, and in all, after slaughtering, the udder was carefully examined for tuberculous lesions and tubercle bacilli. No tuberculosis was found except in one cow in which one quarter of the udder showed four small nodules. These could not possibly have been detected during life.

"We found that the milk of the cows obviously suffering from tuberculosis \* \* \* contained tubercle bacilli whether the milk was obtained in the ordinary way or was withdrawn from the teat by means of a sterilized catheter. The presence of tubercle bacilli in the milk of cows clinically recognizable as tuberculous confirms the opinion we expressed in our Second Interim Report that the milk of such cows must be considered dangerous for human beings.

"The experiments which we have carried out with regard to the infectivity of the feces of tuberculous cows were dictated by knowledge of the fact that dirt of various kinds from cows and the cowsheds is almost constantly present in milk as it reaches the consumer. Cows suffering from extensive tuberculosis of the lungs must discharge considerable numbers of bacilli from the air passages in the act of coughing and some of the bacilli thus expelled may find their way into the milk. But our experiments indicate that the excrement of cows obviously suffering from tuberculosis of the lungs or alimentary canal must be regarded as much more dangerous than the matter discharged from the mouth or nostrils. We have found that even in the case of cows with slight tuberculous lesions, tubercle bacilli in small numbers are discharged in the feces, while as regards cows clinically tuberculous, our experiments show that the feces contain large numbers of living and virulent tubercle bacilli."

Eastwood and Griffith (7) of Great Britain report tubercle bacilli of the bovine type in 55, or 21.1 per cent, of 261 cases of bone and joint disease examined by them. The percentage of bovine cases were as follows: All ages, 21.1 per cent; under 10 years, 29 per cent; over 10 years, 9.4 per cent. The material in all these cases was removed from an infected bone or joint or from an abscess in the neighborhood of such a lesion. The cases were taken without restriction to age, locality or other circumstance.

Dr. Frazier (8) of Edinburgh examined 70 cases of bone and joint

tuberculosis, of which 50, or 60 per cent, showed the bovine type of the tubercle bacillus. He reports that in the greater number of cases the history indicated that the infection was due to cow's milk.

Dr. Richard M. Smith (9), Massachusetts Antituberculosis League, Boston, Mass.: "In general, tuberculosis of bovine origin represents about 25 per cent of all cases of tuberculosis in children under 5 years of age. In certain types of the disease it is very much more. It is estimated that in New York City between 6 and 10 per cent of the children that die in the hospitals each year of tuberculosis die of bovine tuberculosis. The percentage of cases of bone tuberculosis which are due to bovine infection varies very markedly according to the age of the patient. Taking a series of cases, in 67 cases that were investigated, 70 per cent were of bovine origin, and at least 78 per cent under 4 years, so that beginning with all the cases at 1 year, going up to the children at 12 years of age, it ranges from 100 to 60 per cent. Taking 72 consecutive cases of gland tuberculosis which were operated on, 90 per cent were due to the bovine organism. Of these 72 cases, 38 were under 5 years of age, and all but 3 of the 38 were of bovine origin.

"The real hope of eliminating bovine tuberculosis rests in prevention, not in treatment, and it ought to be possible to entirely eliminate bovine tuberculosis. It comes almost exclusively from milk and its products, from milk and cream and butter, ice cream and cheese. The percentage of bovine active, virulent tubercle bacilli in market butter is quite large."

Dr. Sheridan Delépine (10) of England says:

"Taking all evidence into consideration, it is possible to say without fear of exaggeration that not less than 25 per cent of the children under five years of age which are suffering from tuberculosis were infected primarily by the bovine type of the tubercle bacillus. This rate is much lower than one based on probabilities would be."

Ching Yik Wang (11), Edinburgh, Scotland:

"The material for this study was obtained from the Royal Hospital for Sick Children and the Royal Infirmary, Edinburgh, and consisted of postmortem material from 20 children, ranging from 1 to 15 years of age. When the investigations of previous workers are included, the bacteriological examinations of 281 cases of various clinical forms of tuberculosis in Edinburgh resulted in the isolation of the bovine tubercle bacilli in 78.4 per cent of cases under the age of 5 years, in 70.3 per cent between 5 and 16, and in 7.8 per cent over the age of 16 years. Abdominal tuberculosis and tubercular meningitis are together responsible for about 90 per cent of the summed mortality from tuberculosis in children under 1 year, and about 75 per cent in children between 1 and 5 years. The material from 9 children dead from these two diseases was examined bacteriologically and from 6 the bovine type of tubercle bacillus was isolated.

"From the prophylactic point of view, any measure resorted to in combating the disease should be directed not only against the human spread of infection, but also, and more particularly in the case of children, against the bovine source of infection.

"It should be stated that the material used in the investigations was from children of the poorer classes. The results, therefore, should not be held strictly applicable to the community in general or as representing the conditions prevailing in other localities where the environment may be widely different."

Ching Yik Wang (12) gives the following combined table of all cases:

Special Milk Board, Massachusetts State Board of Health (13):

"It is agreed upon by all leading authorities that at least from 5 to 7 per cent of all tuberculosis in human beings is definitely and



|   | Adults 16 Years and Over |                | Children 5 to 16 Years |        | Children Under 5 Years |                 |
|---|--------------------------|----------------|------------------------|--------|------------------------|-----------------|
|   | Human                    | Bovine         | Human                  | Bovine | Human                  | Bovine          |
| Pulmonary tuberculosis including sputum           | 1,000 <sup>1</sup>       | 5              | 28                     | .....  | 45                     | 1               |
| Abdominal tuberculosis                            | 24                       | 7 <sup>2</sup> | 13                     | 17     | 29                     | 34              |
| Generalized tuberculosis                          | 39                       | 2              | 32                     | 3      | 169                    | 22 <sup>3</sup> |
| Tuberculous meningitis                            | 6                        | .....          | 13                     | 5      | 55                     | 10 <sup>3</sup> |
| Tuberculous genito-urinary                        | 35                       | 4              | 4                      | .....  | .....                  | .....           |
| Tuberculous skin                                  | 12                       | 3              | 4                      | 6      | 2                      | .....           |
| Tuberculous cervical adenitis                     | 62 <sup>4</sup>          | 10             | 61 <sup>4</sup>        | 18     | 75                     | 75              |
| Tuberculous axillary                              | 6                        | .....          | 6                      | .....  | 4                      | .....           |
| Tuberculous bones and joints                      | 82 <sup>5</sup>          | 4              | 255 <sup>5</sup>       | 61     | 89 <sup>7</sup>        | 54 <sup>8</sup> |
| Latent tuberculous                                | 2                        | 1              | 2                      | 2      | 4                      | 1               |
| Miscellaneous (other forms)                       | 5                        | 2              | 1                      | .....  | .....                  | 2               |
| Total   | 1,273                    | 38             | 420                    | 171    | 415                    | 199             |
| Percentage of bovine infection at each age period | .....                    | 2.9            | .....                  | 28.9   | .....                  | 32.4            |

Total..... 2,516  
Mixed strains reported by Park and Krumweide..... 11

Grand Total..... 2,527

<sup>1</sup> Including four atypical strains.

<sup>2</sup> Including one intermediate strain.

<sup>3</sup> Including one mixed strain.

<sup>4</sup> Including one atypical strain.

<sup>5</sup> Including three atypical strains.

<sup>6</sup> Including ten atypical strains.

<sup>7</sup> Including two atypical strains.

<sup>8</sup> Including three mixed strains.

directly of bovine origin, and the possibility of the true percentage being still higher can not be denied."

N. Norvick (14): "It was thought worth while to ascertain, having material at hand, whether the percentage of incidence of bovine infection in tuberculous meningitis is appreciable, greater perhaps than is commonly accepted; whether the bovine type of virus has a special predilection for the meninges.

"Park and Krumweide, in their study of bovine and human infection of tuberculosis in man, a study which included about one thousand cases of all forms of tuberculosis, found 15 per cent of bovine infection in tuberculous meningitis. Rosenau, analyzing 1,040 cases, including those studied by Park and Krumweide, by the English and German Commissions, and some cases collected from literature, came to the following figures:

16 years and over, 686 cases, 9 bovine, 1.3 per cent.

Between 5 and 16 years, 132 cases, 33 bovine, 25 per cent.

Under 5 years, 120 cases, 59 bovine, 49 per cent.

"Rosenau states that 'almost half the number of cases tabulated above were studied by the research laboratory and were unselected.' This is important to note. The striking feature of these figures is the alarming percentage of bovine infection in children under 5 years (49 per cent). In adults the percentage is very small—almost insignificant. Undoubtedly, it is due to milk entering as the chief element in the diet of children and serving as the probable path of transmission of tubercular disease, and the fact that the bovine bacilli are much more virulent in the young."

Edward R. Baldwin and Leroy U. Gardner (15), in an article entitled "Reinfection in Tuberculosis, Experimental Arrested Tuberculosis and Subsequent Infections," state: "To sum up our study of this problem, we believe that the lesson to be learned and applied is that, hand in hand with efforts to safeguard the young from infection, more attention should be paid to safeguarding both young and old from disease. Without sputum and dairy hygiene, the supply of dangerously infected young people will be kept up; without earlier diagnosis, education and favorable conditions of life for the pros-

pective victims, clinical tuberculosis will continue at an irreducible minimum."

Allen K. Krause (16) in an article "The Prevention of Tuberculosis, Based on the Relation of Childhood Infection to Tuberculosis in Adult Life," states: "Yet, that childhood infections are prolific breeders of adult tuberculosis can not be denied. Anyone who comes in contact with many adult consumptives needs no better evidence of this fact than good and thorough histories, which he has pieced together after adroit cross-examination of his patients. Scores of these will satisfy every requirement laid down by the most uncompromising proponent of the puerile genesis of adult disease, and physical examination as it brings to light anatomic evidence of hidden, always silent and never suspected residua, will not infrequently clinch post history."

A. Stanley Griffith (17) reports 1,068 cases of tuberculosis of all ages in the human family, in which 20.7 per cent was of bovine origin; 37.55 per cent in children under 5 years of age, 29.45 per cent in children from 5 to 10 years, 14.66 per cent in children from 10 to 16 years, and 6.25 per cent of cases 16 years and upwards were of bovine origin.

Dr. W. A. Evans (18), Chicago, in a paper entitled "Why Health Departments are Interested in the Eradication of Bovine Tuberculosis," which was read before the tuberculosis eradication conference, Chicago, Ill., November, 1921, states:

"There were 1,096,436 deaths from all causes in the registration area in 1919. Of these, the total number of deaths from all tuberculosis was 106,985, and the total number of deaths of children under 5 from all tuberculosis was 5,830. The estimate of Park is that in 1919, 583 children under five years of age died of tuberculosis due to bovine tubercle bacilli in the registration area. This is an estimate only of deaths due to tuberculosis in children under 5.

"The theory of Von Behring as to the cause of tuberculosis in adults is now decidedly in the ascendant. It is that much, if not most, of the clinical tuberculosis of adult life is the result of infection which has lain dormant for more than a decade, is developed into a clinical disease by some period of stress.

"This theory magnified the importance of infections in childhood, and incidentally of infections with bovine bacilli.

"There have been no adequate studies to determine the possibility that a bovine bacillus infection in childhood may result in the excretion of bacilli conforming to the human type of adult life. In fact, the typing of bacilli excreted by adults having tuberculosis has been wholly inadequate."

Schroeder (19) says: "The bovine bacillus is responsible for tuberculosis in children. Every case of tuberculosis in the human subject due to bovine bacilli must be charged to intimate contact in most cases through the ingestion of contaminated dairy products between persons and tuberculous cattle."

Fishberg (20) says:

"While it is difficult to say how much tuberculosis is of bovine origin and how much of human origin, yet pathologists who have studied the question carefully now agree that about eleven-twelfths of all tuberculosis in man is caused by human bacilli and about one-twelfth by bovine bacilli; and that bovine infection, as it occurs, predominates in childhood, while the human infection, although accountable for a large percentage of disease during childhood, is accountable for nearly all disease of adult life. In this connection the following table from the Imperial German Board of Health is interesting. It presents an analysis of 1,400 investigated cases.

"The studies of Eastwood and Griffith are very interesting in that they have made a special study of the type of infection in bone and

|                                       | Total Number Investigated Cases | Type  |        | Percentage of All Cases Due to Bovine Type |             |
|---------------------------------------|---------------------------------|-------|--------|--|-------------|
|                                       |                                 | Human | Bovine | In Adults                                  | In Children |
| Tuberculosis of the lungs             | 811                             | 807   | 5      | 0.66                                       | 0.00        |
| Tuberculosis of the bones and joints  | 99                              | 95    | 5      | 0.66                                       | 4.30        |
| Meningeal tuberculosis                | 33                              | 30    | 3      | 0.00                                       | 10.34       |
| Generalized tuberculosis              | 178                             | 147   | 33     | 2.50                                       | 23.18       |
| Tuberculosis of the cervical glands   | 167                             | 120   | 47     | 5.80                                       | 40.70       |
| Tuberculosis of the mesenteric glands | 112                             | 78    | 35     | 12.10                                      | 51.0        |
| Totals                                | 1,400                           | 1,277 | 128    |  |             |

joint tuberculosis. Basing their classification upon cultural characteristics and the virulence of the bacilli as shown upon rabbits, they examined a total of 261 cases and found the human type of bacilli in 196, bovine in 55, and a bacillus which they were unable to classify in 10.

"I desire to emphasize in this connection the fact that the bovine type of bacillus disappears very rapidly from clinical tuberculosis after the tenth year, indicating that the bovine bacillus produces infection only during early child life; or that it probably changes its characteristics with growth upon human soil for many years, and assumes the characteristics of the human bacillus.

"We must recognize the fact that our methods of determining the difference between bovine and human infection are not absolutely reliable; yet we can not help noting that the results obtained by different observers agree fairly well. It is also suggestive that all find little bovine infection in adult life.

"These same writers have made a study of the types of bacilli occurring in the genito-urinary tract, and I will quote their summary: 'Seventeen cases were examined, the disease affecting the genital organs in nine instances (7 testicles, 1 salpinx, 1 prostate) and the urinary tract in 8. The bacilli obtained were of "human" type in 14 cases and "bovine" type in 3. The 3 "bovine" cases were affections of the kidney in persons aged, respectively, 25, 19 and 20 years.'

"Griffith further reports an analysis of results obtained from the investigation of sputum of 212 patients, suffering from pulmonary tuberculosis in England and Scotland, with the following results: Isolated the standard human type of bacilli in 205; the standard bovine type in 3; and an atypical human type in 4 of the cases. In discussing this question, Griffith says: 'In this country, therefore, pulmonary tuberculosis which has arrived at the ulcerative stage is but very rarely referable to tubercle bacilli of bovine type.' While such apportionment of bovine and human infection in man seems to be fairly well accepted, yet it comes in conflict with other pathological ideas which seem to be fairly established. We are taught today that clinical tuberculosis in adult life is largely an extension from an infection which takes place in early child life (Romer). If this is true, and our knowledge of the disease supports the theory, what is there to hinder this metastatic infection in later life from being of either bovine or human origin; and, according to the data quoted above, why is not adult tuberculosis more largely of bovine type, unless mutation of type takes place? Children unquestionably take in both types of bacilli and are infected by same; and as yet we do not know that the resulting infections differ to any great extent, or even at all, in their subsequent pathological change or clinical course."

Dr. Louis Cobbett (21), Lecturer in Pathology at Cambridge University, says:

"These remarks introduce the question whether the bovine type of tubercle bacillus is more or less virulent for man than the human type. At first sight it might seem, from the fact that the bovine bacillus is only found in a small proportion of fatal cases of human tuberculosis—cases confined, moreover, to very young children whose susceptibility might be supposed to be greatest—that the bovine type of tubercle is for man, of considerably lower virulence than the human. But is this really the case? A. S. Griffith thinks that it is not. It might be suggested that if comparative inoculations were made, the bovine type would prove a little more virulent for the human being, as for the monkey or the guinea-pig. It has been pointed out that it is easier to infect by the aerial route than by the alimentary route; that the human type of tubercle bacillus has a practical monopoly of this easier route, while the bovine type has no chance of infecting except by the more difficult route of the alimentary canal; consequently the bovine type succeeds, as a rule, only in young children, when susceptibility is high and milk, the chief carrier of bovine bacilli, is taken in large quantities. I think this line of argument is worthy of serious consideration.

"The fact that bovine tubercle bacilli are so frequent in mesenteric glands and are so rare in the lungs is in opposition to Calmette's view that pulmonary tuberculosis is commonly caused by tubercle bacilli absorbed through the intestinal mucous membrane, and carried by the thoracic duct and the innominate vein to the right side of the heart, and so to the lungs. If this were the common channel of infection, we should expect to find the same proportion of bovine infections in pulmonary as in abdominal tuberculosis. Lastly, the fact that bovine tubercle bacilli have frequently been found in abdominal and cervical tuberculosis (that is, in cases arising from infection through some part of the alimentary canal) and seldom in the lungs, is easily explained on the ground that human tubercle bacilli alone are sprayed into the air, therefore alone have a chance of entering the lungs directly, while bovine tubercle bacilli, being limited to food substances, can only infect man through the alimentary canal. The inhalation theory of the origin pulmonary tuberculosis thus receives strong support.

"In cases of lupus it is, at first sight, surprising to find so high a proportion of bovine infections as 50 per cent. Lupus usually arises on the face and, to a lesser extent, on the buttocks, to which the tubercle bacilli may be considered to have access after passing through the alimentary canal. It may therefore be considered that usually, when it is not secondary to ulceration of a caseous gland, it is caused by direct application of tubercle bacilli to the skin. Now, bovine bacilli in milk and tubercle bacilli of human type which, whether dry or moist, get into the air from consumptive patients, have, probably, about an equal chance of getting to the skin of the face in numbers sufficient to cause infection. Hence it is that the proportion of infections with one type of mammalian tubercle bacillus is about equal to that of the other.

"The percentage of total mortality from all kinds of tuberculosis caused by the bovine tubercle bacillus in England and Wales, in the year 1919, was 6.5, and therefore due to infection coming from the cow, probably in the immense majority of cases through milk."

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PRESIDENT KINSLEY: You have been privileged to hear a very splendid report. What is your pleasure?

(On motion of Dr. Faust the report was received.)

#### COMMITTEE ON REVISION OF NATIONAL FORMULARY

PRESIDENT KINSLEY: We have one other committee report that we can dispose of this afternoon, that of the Committee on Revision of National Formulary. Dr. Brumley was chairman, Dr. Klein brought the report in, and Dr. Mayo has it and will read it.

(Secretary Mayo read the report, which follows.)

In the revision of the National Formulary by the General Committee it was thought advisable to request the various national organizations to appoint special committees to assist with the portions of the revision of special interest to them. Accordingly this request was presented to the American Veterinary Medical Association, and



President Kinsley created the present committee to go over the formulas at present in the National Formulary and also to present any new formulas that might seem desirable from a professional standpoint and report direct to the General Committee.

In order to obtain the desires of the members of the A. V. M. A. in regard to methods of procedure and what formulas should be included in the revision of the National Formulary, it was decided by the committee to send out a questionnaire for such information. The following abstract of letters and questions was sent to 750 members of the A. V. M. A.:

"The committee desires to have the advice and assistance of the members of the Association in carrying out its work, and therefore we are writing to you and other members of the Association for suggestions.

"Are there any formulas which are frequently used by yourself or other veterinarians the publication of which in the National Formulary would be a convenience to the veterinary profession in general? If so, will you not send them to the chairman of the committee?

"Can any of the formulas at present published in the National Formulary be changed in any way to make them more useful to veterinarians? The committee will be glad to have your opinion on this question.

"The revision of the National Formulary is now under way, preparatory to issuing a new edition, and all changes and additions to be made must be decided upon very soon. Will you not therefore give the above questions prompt and careful consideration and send us any new formulas or changes you may have to suggest as soon as possible?"

The selection of names for the purpose of sending out the letter and questionnaire was made by writing to the Resident State Secretaries with the request that they send by return mail the names and addresses of twenty of the prominent veterinarians in their State who would probably be interested in this work. Some difficulty was encountered in obtaining replies from the State Secretaries. In a few instances it was necessary to make selections ourselves from the roll of members of the A. V. M. A.

As stated before, 750 letters and questionnaires were sent to the list thus obtained. The result was unsatisfactory. Only a few replies were obtained. Many veterinarians are evidently unacquainted with the National Formulary and did not seem interested in such a book. Some few suggestions were received and were gone over carefully by the members of the committee, but in the majority of instances the committee did not feel justified in recommending them for incorporation in the National Formulary. Therefore, only a few new formulas have been recommended which are in common use and have been found to be efficient and which, it seemed, should be incorporated in the National Formulary to make them more convenient and accessible to the profession in general.

A list of the formulas at present in the National Formulary were considered and a recommendation made that they be continued in the present revision.

The complete report sent to the National Committee follows:

"The committee appointed by the President of the American Veterinary Medical Association to suggest formulas which might be useful to veterinarians for incorporation in the National Formulary and also to recommend any changes which may seem desirable in the formulas included in that publication begs leave to submit the following:

"In order to obtain information from the veterinary profession their desires in this matter, and also to aid the committee in its

action, it was decided to send a questionnaire to representative members of the A. V. M. A. in each of the States. These questions consist of two parts:

"1. New formulas which were frequently used by them or other veterinarians the publication of which would be a convenience to the veterinary profession in general.

"2. Suggestions for changes in the formulas at present in the National Formulary which would make them more desirable and useful to veterinarians.

"1. Under this section of our questionnaire we were unable to obtain very much information. Some formulas were suggested, but the majority of them were of minor importance and the committee does not feel justified in recommending them as having sufficient merit to be incorporated in the National Formulary.

"The following formulas are recommended under this section by the committee, the members of which are unanimous in their opinion that they should be incorporated in the National Formulary:

- (a) *White Lotion.*  
Zinc sulphate.....6 drams  
Lead acetate.....1 ounce  
Water.....30-40
- (b) *Iodin Ointment.*  
(Colorless.)
- (c) *Iodized Calcium.*
- (d) *Camphorated Oil (20%)*  
For hypodermic use.
- (e) *Elixir Terpin Hydrate.*

"The committee has made no effort to standardize these formulas, as it is understood that your special committee will properly prepare them for incorporation in the National Formulary.

"2. You will find appended to list of formulas already in the National Formulary that our committee recommends for retention in the present revision.

"H. J. MILKS,  
"L. A. KLEIN,  
"O. V. BRUMLEY, *Chairman.*"

*Preparations from the National Formulary to be Retained, as Recommended by the Committee of the American Veterinary Medical Association.*

**CATAPLASMA KAOLINI**

*Cataplasm of Kaolin*

(U. S. P. VIII)

Catapl. Kaolin.

|   |           |
|---|-----------|
| Kaolin, recently dried at 110° C. and cool, and in very fine powder, five hundred and sixty-five grammes..... | 565.0 Gm. |
| Boric Acid, in very fine powder, forty-five grammes.....  | 45.0 Gm.  |
| Thymol, five-tenths of a gramme.....  | 0.5 Gm.   |
| Methyl Salicylate, two grammes.....   | 2.0 Gm.   |
| Oil of Peppermint, five-tenths of a gramme.....   | 0.5 Gm.   |
| Glycerin, recently heated to 100° C., three hundred and eighty-seven grammes .....                            | 387.0 Gm. |

To make about one thousand grammes..... 1000 Gm.

Mix the kaolin with the boric acid, and then thoroughly incorporate the warm glycerin. Finally add the thymol, dissolved in the methylsalicylate and oil of peppermint, and make into a homogeneous mass. Preserve it in air-tight containers.

ELIXIR TERPINI HYDRATIS ET DIACETYLMORPHINÆ

*Elixir of Terpin Hydrate and Diacetylmorphine*

Elix. Terpin. Hyd. et Diacetylmorph. Elixir Terpini Hydratis cum  
Heroina, N. F. III

Diacetylmorphine Hydrochloride, twenty-seven hundredths of a gramme. 0.27 Gm.  
Elixir of Terpin Hydrate, a sufficient quantity.

To make one thousand milliliters. 1000 mls

Dissolve the diacetylmorphine hydrochloride in sufficient of the elixir to measure one thousand milliliters and filter.

Average dose—Metric, 4 mls—Apothecaries, 1 fluidrachm.

FLUIDEXTRACTUM ARNICÆ

*Fluidextract of Arnica*

Fldext. Arnica

Arnica, in No. 20 powder, one thousand grammes. 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 60), using diluted alcohol as the menstruum.

Average dose—Metric, 0.1 ml—Apothecaries, 1½ minims.

FLUIDEXTRACTUM BUCHU COMPOSITUM

*Compound Fluidextract of Buchu*

Fldext. Buchu Co.

Buchu, in No. 40 powder, six hundred and twenty-five grammes. 625 Gm.

Cubeb, in No. 40 powder, one hundred and twenty-five grammes. 125 Gm.

Juniper Berries, in No. 20 powder, one hundred and twenty-five grammes. 125 Gm.

Uva Ursi, in No. 40 powder, one hundred and twenty-five grammes. 125 Gm.

Prepare a Fluidextract by Type Process A (see page 60), using a mixture of two volumes of alcohol and one volume of water as the menstruum.

Average dose—Metric, 2 mls—Apothecaries, 30 minims.

FLUIDEXTRACTUM STRAMONII

*Fluidextract of Stramonium*

(U. S. P. VIII)

Fldext. Stramon.

One hundred milliliters of Fluidextract of Stramonium yields not less than 0.22 Gm. nor more than 0.28 Gm. of the alkaloids of Stramonium.

Stramonium, in No. 40 powder, one thousand grammes. 1000 Gm.

Prepare a Fluidextract by Type Process A (see page 60), using a mixture of two volumes of alcohol and one volume of water as the menstruum.

After dissolving the soft extract in the reserve, assay 10 mls of this liquid as directed below, and, from the result thus obtained, ascertain by calculation the amount of alkaloids in the remainder of the liquid and add to this enough menstruum to make the finished Fluidextract contain 0.25 Gm. of the alkaloids of stramonium in each one hundred milliliters.

*Assay*—Introduce 10 mls of Fluidextract of Stramonium into a separator and add 10 mls of distilled water and 2 mls of ammonia water. Completely extract the alkaloids by shaking out repeatedly with chloroform and then extract the alkaloids from the chloroform solution by shaking out repeatedly with weak sulphuric acid until the alkaloid is completely removed. Collect the acid washings in a separator, add ammonia water until the solution is decidedly alkaline to litmus, and completely extract the alkaloid by shaking out repeatedly with chloroform. Evaporate the combined chloroform washings to dryness, dissolve the alkaloids from the residue in exactly 5 mls of tenth-normal sulphuric acid V. S. and titrate the excess of acid with fifteenth-normal potassium hydroxide V. S., using cochineal T. S. as indicator.

Each ml of tenth-normal sulphuric acid V. S. consumed corresponds to 28.92 milligrammes of the alkaloids of stramonium.

Average dose—Metric, 0.05 ml—Apothecaries, 1 minim.

LINIMENTUM TEREBINTHINÆ ACETICUM

*Acetic Turpentine Liniment*

Lin. Terebinth. Acet.

Linimentum Album. Stokes Liniment. St. John Long's Liniment

Oil of Turpentine, four hundred milliliters. 400 mls

Oil of Lemon, sixteen milliliters. 16 mls

Acetic Acid, eighty milliliters. 80 mls

Hen's Egg

Rose Water, each, a sufficient quantity.

To make one thousand milliliters. 1000 mls

Triturate the contents of two fresh eggs and the yolks of two others with the oil of turpentine and the oil of lemon in a mortar until they are thoroughly mixed.

Then incorporate the acetic acid and sufficient rose water to make the product measure one thousand milliliters.

Shake the liniment, whenever any of it is to be dispensed.

#### LINIMENTUM SAPONATO-CAMPHORATUM

*Camphorated Soap Liniment*

Lin. Sapon.-Camph. Opodeldoc Solid Opodeldoc

|   |          |
|---|----------|
| Monohydrated Sodium Carbonate, ten grammes.....   | 10 Gr.   |
| Stearic Acid, fifty grammes.....                  | 50 Gr.   |
| Water, one hundred milliliters.....               | 100 mls  |
| Camphor, in fine powder, twenty-five grammes..... | 25 Gm.   |
| Oil of Thyme, three milliliters.....              | 3 mls    |
| Oil of Rosemary, six milliliters.....             | 6 mls    |
| Ammonia Water, fifty milliliters.....             | 50 mls   |
| Alcohol, a sufficient quantity.....               |          |
| To make one thousand milliliters.....             | 1000 mls |

#### LIQUOR ANTISEPTICUS

*Antiseptic Solution*

(Replacing U. S. P. VIII)

Liq. Antisept.

|  |           |
|--|-----------|
| Boric Acid, twenty-five grammes.....                   | 25.0 Gm.  |
| Thymol, one gramme.....                                | 1.0 Gm.   |
| Eucalptol, five milliliters.....                       | 5.0 mls   |
| Methyl Salicylate, one and two-tenths milliliters..... | 1.2 mls   |
| Oil of Thyme, three-tenths of a milliliter.....        | 0.3 ml    |
| Menthol, one gramme.....                               | 1.0 Gm.   |
| Sodium Salicylate, one and two-tenths grammes.....     | 1.2 Gm.   |
| Sodium Benzoate, six grammes.....                      | 6.0 Gm.   |
| Alcohol, three hundred milliliters.....                | 300.0 mls |
| Purified Talc, twenty grammes.....                     | 20.0 Gm.  |
| Water, a sufficient quantity.....                      |           |
| To make one thousand milliliters.....                  | 1000 mls  |

Dissolve the boric acid, sodium benzoate and sodium salicylate in six hundred milliliters of water and the other ingredients in two hundred milliliters of alcohol. Pour the aqueous solution into the alcohol solution, add the talc and allow the mixture to stand, with occasional agitation, during forty-eight hours. Then filter, returning the first portions of the filtrate and then sufficient water to make the product measure one thousand milliliters.

Average Dose—Metric, 4 mls—Apothecaries, 1 fluidrachm.

#### LIQUOR SODII BORATIS COMPOSITUS

*Compound Solution of Sodium Borate*

Liq. Sod. Bor. Co. Dobell's Solution

|  |          |
|--|----------|
| Sodium Borate, fifteen grammes.....      | 15 Gm.   |
| Sodium Bicarbonate, fifteen grammes..... | 15 Gm.   |
| Liquefied Phenol, three milliliters..... | 3 mls    |
| Glycerin, thirty-five milliliters.....   | 35 mls   |
| Water, a sufficient quantity.....        |          |
| To make one thousand milliliters.....    | 1000 mls |

Dissolve the sodium borate and sodium bicarbonate in about five hundred milliliters of water, add the glycerin and liquefied phenol, and allow the mixture to stand half an hour or until the effervescence has ceased; then add sufficient water to make the product measure one thousand milliliters and filter.

#### PILULÆ ALOINI, STRYCHNINÆ ET BELLADONNÆ COMPOSITÆ

*Compound Pills of Aloin, Strychnine and Belladonna*

Pil. A. A. et B. Co.

|   |          |
|---|----------|
| Aloin, one and three-tenths grammes.....                                  | 1.30 Gm. |
| Strychnine, five hundredths of a gramme.....                              | 0.05 Gm. |
| Pilular Extract of Belladonna Leaves, eight-tenths of a gramme.....       | 0.80 Gm. |
| Extract of Cascara Sagrada, three and twenty-five hundredths grammes..... | 3.25 Gm. |

To make one hundred pills..... 100 pills

Uniformly mix the several ingredients, form a mass and divide it into one hundred pills.

Average dose—1 pill.

PILULÆ FERRI, QUININÆ, ALOES ET NUCIS VOMICÆ

*Pills of Iron, Quinine, Aloes and Nux Vomica*

Pil. Ferr. Cuin. Aloe. et Nuc. Vom. Pilulæ Quadruplices, N. F. III.  
Quadruplex Pills. Pilulas Ferri et Quininae Compositæ

|  |           |
|--|-----------|
| Exsiccated Ferrous Sulphate, six and five-tenths grammes.....                | 6.5 Gm.   |
| Quinine Sulphate, six and five-tenths grammes.....                           | 6.5 Gm.   |
| Aloes, six and five-tenths grammes.....                                      | 6.5 Gm.   |
| Extract of Nux Vomica, one and six-tenths grammes.....                       | 1.6 Gm.   |
| Extract of Gentian, a sufficient quantity,<br>To make one hundred pills..... | 100 pills |

Mix the extract of nux vomica with the aloes, thoroughly incorporate the ferrous sulphate and quinine sulphate, then form a mass with the extract of gentian and divide it into one hundred pills.

Average dose—1 pill.

SAL CAROLINUM FACTITIUM

*Artificial Carlsbad Salt*

Sal. Carol. Fact.

1. In dry, amorphous form:

|   |         |
|---|---------|
| Potassium Sulphate, two grammes.....        | 2 Gm.   |
| Sodium Chloride, eighteen grammes.....      | 18 Gm.  |
| Sodium Bicarbonate, thirty-six grammes..... | 36 Gm.  |
| Sodium Sulphate, one hundred grammes.....   | 100 Gm. |

To make about one hundred grammes..... 100 Gm.

Mix the sulphate and chloride and dry to constant weight at about 40° C., cool, add the sodium bicarbonate and mix thoroughly.

2. In crystalline form:

|  |         |
|--|---------|
| Potassium Sulphate, in crystals, two grammes.....        | 2 Gm.   |
| Sodium Chloride, in crystals, eighteen grammes.....      | 18 Gm.  |
| Monohydrated Sodium Carbonate, twenty-eight grammes..... | 28 Gm.  |
| Sodium Sulphate, in crystals, one hundred grammes.....   | 100 Gm. |
| Distilled Water, one hundred milliliters.....            | 100 mls |

To make about one hundred and eighty grammes..... 180 Gm.

Dissolve the potassium sulphate and sodium chloride in the distilled water, and add this solution to the other two salts, previously melted in a tared dish, at a gentle heat, in their own water of crystallization. Evaporate the mixture to one hundred and eighty grammes, set it aside in a cool place, and stir it frequently, to prevent the formation of large crystals, taking care, however, that none of the salt separates in a pulverulent form. Distribute any remaining mother liquor uniformly over the crystals, and dry the whole mixture sufficiently by exposure to air, so that it will retain its crystalline character.

NOTE.—A solution of 1 Gm. of the dry or 1.75 Gm. of the crystalline salt in 200 mls of water is similar to an equal volume of Carlsbad water (Sprudel) in its main constituents.

SYRUPUS RHAMNI CATHARTICÆ

*Syrup of Rhamnus Cathartica*

Syr. Rham. Cathart. Syrup of Buckthorn Berries. Syrupus Spinæ Cervinæ

|  |           |
|--|-----------|
| Fluidextract of Rhamnus Cathartica, two hundred milliliters.....       | 200.0 mls |
| Oil of Fennel, two-tenths of a milliliter.....                         | 0.2 ml    |
| Oil of Cinnamon, two-tenths of a milliliter.....                       | 0.2 ml    |
| Syrup, a sufficient quantity,<br>To make one thousand milliliters..... | 1000 mls  |

Add the oils to the fluidextract and mix this with sufficient syrup to make the product measure one thousand milliliters.

Average dose—Metric, 8 mls—Apothecaries, 2 fluidrachms.

TINCTURA ALOES ET MYRRHÆ

*Tincture of Aloes and Myrrh*

(U. S. P. VIII)

Tr. Aloe. et Myrrh.

|   |         |
|---|---------|
| Aloes, in No. 40 powder, one hundred grammes.....       | 100 Gm. |
| Myrrh, in No. 40 powder, one hundred grammes.....       | 100 Gm. |
| Glycyrrhiza, in No. 40 powder, one hundred grammes..... | 100 Gm. |
| Alcohol,<br>Water, each a sufficient quantity.          |         |

To make one thousand milliliters..... 1000 mls

Mix seven hundred and fifty milliliters of alcohol with two hundred and fifty milliliters of water. Macerate the aloes, myrrh, and glycyrrhiza in a stoppered container, in a moderately warm place, with seven hundred and fifty milliliters of the menstruum, for seven days, with occasional agitation; then filter through purified cotton, or a plain filter, and, when the liquid has drained off completely,



pass enough menstruum through the residue to make the product measure one thousand milliliters.

Average dose—Metric, 2 mls—Apothecaries, 30 minims.

**TINCTURA SABAL ET SANTALI**  
*Tincture of Saw Palmetto and Santal*  
Tr. Sabal. et Santal

|   |          |
|---|----------|
| Sabal, in about No. 16 powder, two hundred grammes..... | 200 Gm.  |
| Sandal Wood, in No. 60 powder, sixty-five grammes.....  | 65 Gm.   |
| Alcohol,  |          |
| Water, each, a sufficient quantity,                     |          |
| To make one thousand milliliters.....                   | 1000 mls |

Mix four volumes of alcohol with one volume of water, and saturate the drugs with this menstruum. After macerating for two days, percolate them in the usual manner with sufficient menstruum of the same strength until the product measures one thousand milliliters.

Average dose—Metric, 4 mls—Apothecaries, 1 fluidrachm.

**UNGUENTUM RESORCINOLIS COMPOSITUM**  
*Compound Resorcinol Ointment*  
Ung. Resorcin. Co.

|   |        |
|---|--------|
| Resorcinol, six grammes.....                  | 6 Gm.  |
| Zinc Oxide, six grammes.....                  | 6 Gm.  |
| Bismuth Subnitrate, six grammes.....          | 6 Gm.  |
| Rectified Oil of Birch Tar, six grammes.....  | 6 Gm.  |
| Yellow Wax, ten grammes.....                  | 10 Gm. |
| Petrolatum, twenty-five grammes.....          | 25 Gm. |
| Anhydrous Wool Fat, twenty-eight grammes..... | 28 Gm. |
| Glycerin, thirteen grammes.....               | 13 Gm. |

To make one hundred grammes..... 100 Gm.

Melt the yellow wax and anhydrous wool fat in a dish on a water bath. Rub the zinc oxide and bismuth subnitrate with the petrolatum until smooth and add it to the melted mixture. Dissolve the resorcinol in the glycerin, incorporate the solution with the warm mixture just prepared, then add the oil and stir the ointment until it is cold.

**UNGUENTUM SULPHURIS ALKALINUM**  
*Alkaline Sulphur Ointment*  
Ung. Sulphur. Alk.

|   |        |
|---|--------|
| Sublimed Sulphur, twenty grammes.....     | 20 Gm. |
| Potassium Carbonate, ten grammes.....     | 10 Gm. |
| Water, five milliliters.....              | 5 mls  |
| Benzoinated Lard, sixty-five grammes..... | 65 Gm. |

To make one hundred grammes..... 100 Gm.

Rub the sulphur with the potassium carbonate and the water, until a smooth, homogenous mixture results, then gradually add the benzoinated lard, and mix thoroughly.

**UNGUENTUM ZINCI STEARATIS**  
*Ointment of Zinc Stearate*  
(U. S. P. VIII)  
Ung. Zinc. Stear.

|   |        |
|---|--------|
| Zinc Stearate, in fine powder, fifty grammes..... | 50 Gm. |
| White Petrolatum, fifty grammes.....              | 50 Gm. |

To make one hundred grammes..... 100 Gm.

Rub the zinc stearate with the white petrolatum until a smooth ointment is produced.

**VINUM COLCHICI SEMINIS**  
*Wine of Colchicum Seed*  
(U. S. P. VIII)  
Vin. Colch. Sem.

One hundred milliliters of Wine of Colchicum Seed yields not less than 0.036 Gm. nor more than 0.044 Gm. of colchicine.

|  |         |
|--|---------|
| Fluidextract of Colchicum Seed, one hundred milliliters..... | 100 mls |
| Alcohol, one hundred and fifty milliliters.....              | 150 mls |
| Sherry Wine, seven hundred and fifty milliliters.....        | 750 mls |

To make one thousand milliliters..... 1000 mls

Mix them. Set the mixture aside for two days and then filter.  
*Assay*—Evaporate 150 mls of Wine of Colchicum Seed to 15 mls and proceed as directed under Fluidextractum Colchici Cormi.  
 Average Dose—Metric, 2 mls—Apothecaries, 30 Minims.

## MISTURA ADSTRINGENS

*Astringent Mixture*

Mist. Adstring.

Mistura Adstringens et Escharotica, N. F. III. Villate's Mixture

|   |         |
|---|---------|
| Solution of Lead Subacetate, one hundred milliliters.....     | 100 mls |
| Copper Sulphate, sixty-five grammes.....                      | 65 Gm.  |
| Zinc Sulphate, sixty-five grammes.....                        | 65 Gm.  |
| Diluted Acetic Acid, eight hundred and fifty milliliters..... | 850 mls |

Dissolve the copper sulphate and zinc sulphate in the diluted acetic acid, add the solution of lead subacetate, and agitate thoroughly.

Shake this preparation well before dispensing it, so that the precipitate will be uniformly distributed.

On motion of Dr. Connaway the report was accepted.

Adjournment.

## SMALL-ANIMAL SECTION

WEDNESDAY MORNING, AUGUST 30, 1922

The Small-Animal Section of the A. V. M. A. convened at 10:15 a. m., at the Planters Hotel, St. Louis, Mo., Chairman J. C. Flynn, of Kansas City, Mo., presiding.

CHAIRMAN FLYNN: Not many years ago, you will recall, you who have been attending the meetings, that if a paper was presented on small animals, or a clinical case presented, the practitioners were somewhat disgusted. Many of them would get up and leave the room. If they sat and listened, they listened with indifference. A vast change is coming over veterinary practice. If those who are interested in small-animal work take the trouble to investigate a little or to listen, they will find that all over the country the veterinarians are waking up to the possibilities of small-animal work, and particularly is this true in the cities.

About two or three weeks ago I attended a State meeting in Oklahoma City, and I found there a new hospital for small animals, that had just been finished, and it was crowded. The hospital had been completed only a few days, and it was filled up.

The fact that we haven't had a good-sized small-animal practice is the fault of the veterinarians and not the fault of the public. The public was ready for it for years, but the veterinarian has given his time to the large animals and wasn't interested in that. When the tractors came along and took away a good deal of that practice, they began to look around for other fields to develop. The field was already there and could have been developed many years ago. One doctor told me yesterday that he built his hospital two years ago, and said, "I am only sorry I didn't build my place ten years ago." He said it was a success, and when he was equipped to give service the people wanted it.

In preparing this program, we looked over the field and tried

to secure the very best men we could possibly get. I want to take this opportunity to say that the men have cooperated with me in every respect in preparing this program. In only one case was I refused a paper by anyone whom I requested to prepare one, and he had an ample excuse. The local committee here, Dr. Jennemann, Dr. Darling and Dr. Ellis, have worked untiringly to prepare clinical material, and I am confident that this afternoon we will have ample material to present some most interesting cases; in fact, cases that come up in every-day practice, cases that will be of interest to you. Some dogs were shipped from Texas Saturday, and we haven't heard from them. A dog was shipped from Kansas City, and we haven't heard from him. We had some animals shipped from Colorado last Saturday, and they have arrived. If there is any failure of clinical cases it will be charged up to the railroads and not to the committee in charge, because they have been loyal and faithful and have done everything they could to make this meeting a success.

The first paper on our program is one by Dr. O. V. Brumley, of Columbus, Ohio, entitled, "Gastroenteritis in Small Animals." Dr. Brumley was unable to attend the meeting, but he prepared his paper and sent it in. Dr. E. L. Quitman, of Chicago, will present it.

(Dr. Brumley's paper appeared in the November JOURNAL, page 200. The discussion following it appears elsewhere in this issue.)

#### WEDNESDAY AFTERNOON, AUGUST 30, 1922

The meeting convened at 2 o'clock, Chairman Flynn presiding.

CHAIRMAN FLYNN: We will ask Dr. Frick, of Manhattan, Kans., to present the paper of Dr. W. E. Muldoon on "Sequelæ of Canine Distemper."

(Dr. Frick read Dr. Muldoon's paper, which, with the discussion following it, appears elsewhere in this issue of the JOURNAL.)

CHAIRMAN FLYNN: The next paper will be "Internal Parasites of Dogs and Cats, and Treatment for Removing These Parasites," by Dr. M. C. Hall. The paper will be read by Dr. Hoskins, of Detroit.

(Dr. Hoskins read Dr. Hall's paper, which will appear later.)

CHAIRMAN FLYNN: It seems from Dr. Hall's paper that intestinal parasites of the cat and dog are giving Heinz pickles a close race. There are 47 varieties of the parasites, and Heinz pickles have 57. According to Dr. Hall we still have hopes. He says possibly we will soon be up to the 50 mark.

We will have as the next number on our program a discussion of the diagnosis of demodectic mange, hookworms and *Filaria immitis*, presented by Dr. R. P. Marsteller, of College Station, Tex.

## PARASITES OF DOGS—R. P. MARSTELLER

DR. MARSTELLER: In diseases of dogs that we have to deal with, over 90 per cent of the dogs are infested with some parasite. We have found that in handling dogs, especially by routine in connection with students, it is advisable to make microscopic examination of the feces and blood. This may not apply so well in other sections of the country, but with us it is important. Several phases are of vital importance, particularly in the purchase of dogs. In our part of the country somewhere between 20 to 25 per cent of the dogs have heart worms. Men buying what they call stock dogs, which are used for working cattle, especially in parts of the country where they are dipping cattle, must be very careful. It is the same with valuable hunting dogs and other dogs. If these worms are present the dogs can not stand work. Then we find we have some dogs with heavy infestations of hookworm and other parasites, which makes an examination rather important.

My main idea in presenting this subject to the A. V. M. A. was to call your attention to the simplicity of making a microscopic examination for parasites, and the fact that you can do it with a very simple microscope. You can get one that will do the business from a mail-order house for \$12.50.

It has already been mentioned that successful treatment will cure these different parasites, but the treatment varies. There are no shotgun prescriptions that I have found that are effective for all these parasites. And I don't know any way of making a quick, clean, positive diagnosis in these parasitic diseases of dogs other than to examine the feces and blood and skin—scrapings of the skin. I have dogs here showing some of these diseases. I brought the dogs with me. If any of you are particularly interested, any time during the afternoon I would be glad to prepare some blood specimens. It is not difficult; simply hack a vein in the ear, and you usually find the parasites.

People in our country are insuring dogs, and we should not think of passing a dog for insurance without examining the blood and feces. I don't see how a man can do otherwise, in fairness to all concerned.

We have a great deal of trouble with red mange. We did nearly everything that has been mentioned verbally or in written form, but had little success with it. About eighteen months ago someone told us about the treatment with arsenic. We happened to have a case on hand. We made a positive diagnosis, found the parasite, and treated the animal with 10-grain doses of arsenic and peroxid. We repeated this about four times, and followed each administration with oil given internally. The dog made a prompt recovery, and nothing else was done to it. We have the dog here. Since then we have tried that treatment on any number of cases and they have not gotten well, but

this dog is well. However, about six months ago we accidentally came onto a formula. I know you are tired of hearing of formulae for red mange, but this one contained the following:

8 oz. kerosene,  
8 oz. raw linseed oil,  
1 oz. carbolic acid,  
1 oz. oil of tar,  
 $\frac{1}{4}$  lb. sulphur.

This has absolutely cleaned up all our chronic cases. This is not a pipe dream. I haven't an open case of mange, and I couldn't find one to bring here to show you the parasite. I have dogs that have been treated with this preparation. I know you are going to laugh about that formula, and I laughed about it myself, but it does the business. We apply this with mild rubbing about once a week. We have used nothing else.

DR. MILKS: Do you use precipitated sulphur?

DR. MARSTELLER: Just commercial sulphur. In fact, the man who gave me the formula said, "Use one ten-cent package of sulphur."

Most of these dogs we get are already clipped. I would like to show you a wonderful recovery. This is just a little cur dog. This dog was as splotched as the bulldog is. These places were raw. There were papule pustules all over these areas that you see, and for a long time even after she had haired out the skin looked pink, but that is all cleared up.

Here is another dog which has had about three applications of the remedy that I mentioned, applied about once a week. You can see she has begun to hair up and clean up, and you can't find any pustules on her—or I wasn't able to find any before she left home. These places were raw. I believe she is going to get well, as a number of others have.

DR. MILKS: How lately have you examined her skin with the microscope?

DR. MARSTELLER: We haven't examined her skin with the microscope since we began to treat her. I would be glad to have anyone examine her. As a rule we find after the pustules disappear and the hair begins to come out and the redness disappears we have no further trouble.

DR. MILKS: We have a great deal of trouble with mange. The dog looks typical of the ones that come in to us as to skin trouble, and you can find any quantity of mange.

DR. MARSTELLER: Her legs and all these places on the skin you see were hairless and were filled with pus and pus-like pustules, and there we found the mange mites, plenty of them alive. It may be that you can find some on her, but in looking over her hurriedly before leaving home I could not find any in the skin scrapings or could not find any pustules.

DR. HYDE: Will you make clear to the audience your modus operandi in applying the treatment?



DR. MARSTELLER: Take a soft cloth or paint brush and apply it; leave it on until you make the next application.

DR. QUITMAN: Dr. Marsteller said he used everything or nearly everything in the treatment of mange. I want to ask if he ever used plain, straight castor oil.

DR. MARSTELLER: I had failure with it.

DR. QUITMAN: I have had most brilliant results with it—just plain, straight castor oil—even where the skin had become thoroughly corrugated and thickened.

DR. MARSTELLER: We have had success in sarcoptic mange, but in the red mange we had no success with castor oil. I wouldn't say that dog over there is cured, but I believe she is on the way to recovery, though you may be able to find some mange mites.

Here is a specimen of an intestine covered with hookworm. It was collected from a bunch of fourteen pups, two of which died before they were sent to us, three died during treatment, and the others recovered after they were given carbon tetrachlorid.

Here are two bottles of tapeworms, all taken from one dog.

Here are 1,637 hookworms removed from a 16-months-old pup. They were removed by the usual dose of carbon tetrachlorid. We picked these out of the stool.

#### ANESTHESIA AND CÆSAREAN OPERATION—J. G. HARDENBERGH AND W. G. BROOK

CHAIRMAN FLYNN: Dr. Hardenbergh will demonstrate anesthesia.

DR. HARDENBERGH: The method of anesthesia which I wish to demonstrate is one which was perfected for us in experimental surgery, by which after preliminary etherization in a closed cabinet the dog is placed flat on its back on the operating table, the body in a straight line, and the tube is passed down the trachea.

I think it would be best for me to explain the method after we get over the preliminaries of the operation. I have some slides with which I will demonstrate the entire procedure followed.

DR. MERILLAT: How do you deliver the ether?

DR. HARDENBERGH: By passing the tube down the trachea. The dog breathes the ether in the open ether can with two outlets, one connected with this intratracheal tube, and the other with the open air. The dog breathes the ether vapor off the ether, which has a real lively high tension, and after the animal is thoroughly under it and the anesthesia regulated, it is entirely automatic. The dog can be maintained under complete anesthesia for an hour or more without further attention. It is a method adaptable to one man's technique when occasion re-

quires. It is one we feel is particularly adapted to those practitioners who have small-animal hospitals.

CHAIRMAN FLYNN: Dr. Brook will explain the operation he is about to perform and give you the technique in detail.

(Dr. W. G. Brook demonstrated the Cæsarean operation on a dog, explaining the technique and the various steps.)

DR. BROOK: In performing the Cæsarean operation, we perform it in a median line by making the incision from the umbilical opening down about two or two and one-half or three inches, depending on the size of the dog and condition we find the animal in. In operating I wear thin rubber gloves.

After you have made the external opening, find out which part of the uterus most of the feti are located in. In this case we have the majority of them in the right horn. We will endeavor to bring up this horn to the surface. In bringing the horn to the surface be very careful in manipulating so as not to tear the uterus, or that your finger nails don't go into the uterus proper.

We make our incision in this case at the bifurcation of the uterus, so that you can bring the fetus from the opposite side of the uterus out at this side. Pad the uterus well, so you don't get any of it back in the abdominal cavity. In making the incision into the uterus don't make too small an opening; make the opening large enough to bring the feti to the surface without tearing the uterus. You should remove one horn of the uterus at a time. Be sure to remove all placental membranes. We usually do this operation absolutely without any hemorrhage. If you attempt to remove the feti by manipulating with instruments and bruise the walls of the vagina, your operation will not be successful.

This operation is absolutely as successful as any one you can do, and it is not difficult to do at all. There is no reason why you should not do it. We do this operation very frequently and our results are very good; but we never attempt it after the walls of the vagina are bruised, for the simple reason there is a necrotic condition there, and the dog will get an infection and die in spite of anything you can do.

When you get ready to do the suturing in the uterus, be sure you have all the membranes clean, using a little iodine. Have your assistant stretch the uterus into normal position; after you get it into normal position, make an uninterrupted suture. In suturing use chromic catgut; you will find it more satisfactory. The first line of suture, through the serous and muscular coat, is absolutely covered up.

Let us consider the class of cases in which the Cæsarean operation is indicated. We find that the Bostons give us a lot of trouble in obstetrical work on account of the small pelvic cavity. I have been working for several years on instruments that would relieve that condition.

I have here two instruments that I have been using very successfully. You are perfectly welcome to examine them. Any tool-maker can make them for you, or an instrument company will make them at a reasonable price.

(Dr. Brook exhibited the instruments and explained their use in delivering the fetus in cases of difficult parturition.)

DR. BROOK (continuing): After you find that you can't relieve the animal with the instruments, don't manipulate her too much; resort to a Cæsarean operation. It is very successful when done under favorable conditions. If you find the animal's uterus is bruised a great deal, don't do a Cæsarean operation if you want to save the female, but resort to a complete hysterectomy at once. Don't try to use serum, because no doubt you have infection of the uterus at that time, and consequently the operation would not be successful. By doing a complete hysterectomy you will probably have no trouble and the patient will get well nicely.

After making an uninterrupted suture through the muscular and serous layers of the uterus we make what we call the Lembert suture, taking up the mucosa and muscular, bringing them in over the previous suture which closes up the uterus, and there is no danger of drainage into the abdominal cavity.

In doing this operation I do it mostly by myself, sometimes with one assistant. I use one grain of morphin, and I find under that you can do this operation very successfully. Occasionally you will have to resort to ether, but I always give morphin.

In behalf of Dr. Hardenbergh I might say that his method of anesthesia has been adopted in a lot of the schools, and by a lot of the practitioners, and it is very successful.

DR. FROST: Do you always operate through the median line?

DR. BROOK: I always operate through the median line. In making the incision through the median line you do not have the muscular tissue to bother you in making the suture after the operation, but you have plenty of room there to make the suture without interfering with the mammary glands. You can put the pups to nursing within twenty-four hours, just the same as if nothing had happened.

For bandaging after the operation I put a boracic acid pack over the wound, then a thin layer of gauze, and put a piece of cardboard over the line of incision, with a piece of tape between the teats, clear around the back—and that is all the bandage that is needed. After a few days the dog is liable to tear this down; it will begin irritating a little; then put on a medicated bandage. With careful attention the line of suture will heal within four or five days and you will have no further trouble.

A MEMBER: Is there any special after-treatment?

DR. BROOK: Nothing more than you would have in an oöphorectomy. In doing an oöphorectomy I do it entirely with a

headlight, an electric light. I make a small incision and throw the light, then I can see the horn of the uterus and see it very distinctly from any other of the structures. After you have located the horn of the uterus you can take any kind of a hook you like and reach in there and pick that horn of the uterus up and bring it to the surface through the small opening and remove the ovaries the same as any other method.

DR. FROST: Do you find an oöphorectomy satisfactory to the owner if the bitch comes in heat more than once repeatedly after the operation?

DR. BROOK: I do. Very often you will have a condition where there may be some disturbance of the ovaries, rupture of the cysts, carrying down into the broad ligament, and you may not be successful. By removing a large part of the connective tissue around the ovary you will be absolutely successful. However, there are cases on record, and I have had one instance, where after removing the ovaries the animal came into heat again, but it occurred only once, and that was the end of that. We do have that condition occur sometimes.

CHAIRMAN FLYNN: Didn't that occur where you operated just previous to the estrual period, just within a few days?

DR. BROOK: Yes, sir. You can't change the system that quick.

DR. STOKES: What disadvantage is the flank method over the medial method?

DR. BROOK: I have never resorted to the flank operation, but I have always contended that you have too much muscular tissue to deal with. You don't get healing as rapidly as you do in the median line.

I should advise every veterinarian who has the opportunity to take up with an M. D., who does a great deal of surgery, the matter of watching some of those operations. You have no idea what you can learn of surgery by watching the M. D.'s. In our city we have a medical college, and I attend clinic there very often and watch the different operations, with the courteous invitation of some of the M. D.'s; and you don't know what a help it is. You may get used to the different operations and resort to them in small animals. Your small-animal practice follows the human practice all the way through.

DR. TREMAN: I would like to ask if you have done the complete hysterectomy in sows?

DR. BROOK: My practice is not in the field where we have very much hog work to do, and I have never done Cæsarean or complete hysterectomy of the sow.

DR. BOWER: I would like to ask how you control hemorrhage. Do you ever do ligating in oöphorectomy?

DR. BROOK: In advanced pregnancy sometimes you will be called to do an ovarian, and you will find the animal pregnant. In those cases I make a complete hysterectomy. It is a whole

lot easier, the animal recovers a whole lot better, and your operation consequently is more successful. As for controlling hemorrhages in those cases, I first ligate the arteries, the utero-ovarian arteries above the ovaries, remove the ovaries, and ligate the uterus, then go through the procedure I explained and make a complete hysterectomy. In the majority of ovarian operations I do not ligate the arteries; I use forceps in removing the ovaries by twisting them off.

CHAIRMAN FLYNN: Do you recommend this operation in practically all difficult cases of delivery?

DR. BROOK: Yes.

CHAIRMAN FLYNN: You consider they suffer less, and there is less chance of bad results, fatal results, in the operation than there is in the use of instruments in delivering the young?

DR. BROOK: There is less chance of bad results by using the operation. You will find that by using the instruments we have now you can have better success, but the old forceps we have been using, catching hold of the fetus, and the traction put on it more or less tearing it, proved an injury to the walls of the vagina; consequently you get an infection and the mortality is very high. By resorting to the Cæsarean operation, after you get familiar with it, you will find it a successful operation, and I would say 95 per cent of your cases will make a recovery.

I don't do this operation if somebody else has already made an attempt and bruised the vagina or uterus. After that I wouldn't go ahead and do a Cæsarean operation and tell the owner "I think she will get all right," for the majority of those cases will not.

DR. H. H. BROWN: What effect does this operation have on future pregnancy?

DR. BROOK: If you use the proper suturing material, chromic catgut or plain catgut, you will not have any trouble at all. The animal can go ahead and conceive the following season and come through without any trouble. I had one case in particular where a veterinarian had used silkworm gut, and in that case I had to do a complete hysterectomy in order to save the animal.

DR. H. H. BROWN: Would you advise complete hysterectomy prior to oöphorectomy?

DR. BROOK: You mean if she is pregnant?

DR. BROWN: In any case.

DR. BROOK: Your question is, if some one brings a dog to you and wants oöphorectomy performed. I do not perform hysterectomy; I perform oöphorectomy.

CHAIRMAN FLYNN: I want to thank Dr. Brook for his part of the program here, and also each and every one of the other men who have helped us out on this clinic. I want to repeat that the local committee—Dr. Darling, Dr. Jenneman and Dr. Ellis—have worked hard, and they have produced a number of very interesting cases.



## OTHER CLINICAL CASES

CHAIRMAN FLYNN: We have two kittens here, shipped from Colorado. They are peculiarly afflicted. They are here for diagnosis. The field is open. As near as I can tell from the history that I have of those kittens, they have lost their equilibrium, and seem to be healthy otherwise. We presume this condition existed when they were born. They are Dr. Kingman's kittens.

Here is a dog that came to me a month ago. While tied with long rope, about three months ago, he chased neighbor's dog across the lot. He was thrown backward upon the sidewalk with great force. Within a few days after the tumble he showed evidence of pain while eating, which was noticeable for about a week; then for a week or ten days he appeared normal. Later it was noticed that the dog would prehend his food with his front teeth only, working the food back to the pharynx with the tongue without mastication. This dog is unable to open his mouth any more than possibly an inch and a half or two inches. He was given an anesthetic at our place, and we were just as much unable to open his mouth after he was anesthetized as we are now. We have taken an X-ray of the head, and here are the two photographs. You can look at them, and if you find out anything about it, it is more than we could. This dog is here for diagnosis. He has been around in Kansas City to practically every veterinarian. The owner told me a few days ago that the head had begun to shrink. I presume it is the temporal muscles that are shrinking from lack of use. I notice on examination here now that the head is smaller than it was when I had him a few weeks ago.

Dr. Darling has a case here which he will explain; it is quite interesting.

DR. DARLING: This dog has a compound fracture of the lower jaw, and a lacerated wound on the tongue. This happened eight days ago. Supposedly the dog used to tease an old sow, and the supposition is that the sow snapped the dog. The dog is starting to take solid food in his mouth. He will make a good recovery, I think.

DR. FROST: What was the treatment?

DR. DARLING: There was not much treatment. We gave him rectal injections of beef broth and mutton broth. Today he is eating a little ground Hamburger, and we expect him to get better. There is a great deal of slough here on the lip. About one-third of this will slough off. He is a fine hunting dog.

Here we have a 9-year-old cat that had a fistulous opening on the cheek, communicating with the ear. If we had time the intention was to run a groove directly in there and open up the whole tract to see if we couldn't make a permanent repair.

We have a case here of an infectious venereal granuloma. You

see the watery condition around the sheath. That condition is of six months' standing and has received no treatment. We intended to cauterize that.

CHAIRMAN FLYNN: What is the treatment recommended?

DR. DARLING: Curetting and cauterizing; but there is a great tendency to recurrence.

DR. L. G. BROWN: Would you think it advisable to remove any of the prepuce?

DR. DARLING: I think you can save the prepuce in this case.

Here is a small gland under the membrane; it is quite a common condition of the eye in dogs. A little cocain is injected and the gland is taken out very readily.

CHAIRMAN FLYNN: That is a very simple and satisfactory operation as a rule, and people are well satisfied with it. Dr. Darling recommended the use of a little cocain, and I believe by raising the growth up and nipping it off with nippers, usually in 24 to 47 hours you have practically a complete recovery, and the owner is very well satisfied.

That completes the small-animal program.

Adjournment.

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#### FROM THE SECRETARY'S OFFICE

There will be a meeting of the Executive Board, at the La Salle Hotel, Chicago, Ill., Tuesday morning, December 5, at 10 o'clock.

A new supply of automobile emblems has been secured. All the unfilled orders which had accumulated while awaiting the new supply have been filled. Orders will now be filled on the day of receipt.

This is the year for the election of a member of the Executive Board from the First District, which includes all of Canada. A notice calling for nominations will be sent out shortly to all members in the First District whose dues are paid for the current year. Members whose dues are unpaid are not entitled to a vote.

Quite a few members in all of the districts have neglected to remit their dues for the current year. A second notice to such members will be sent out during the month of December. Members desiring to save the Association the expense of sending out this second notice should remit their dues immediately to the Secretary, P. O. Box 471, Detroit, Mich. Kindly make checks payable to the American Veterinary Medical Association.

H. PRESTON HOSKINS, *Secretary*.

## OTHER MEETINGS

### ARKANSAS VETERINARY ASSOCIATION

The Arkansas Veterinary Association convened at Little Rock on October 11 with a number of stock men and poultry men present as guests of the association.

A paper prepared by Dr. B. F. Kaupp, Poultry Investigator and Pathologist North Carolina Experiment Station, was read by Dr. Shull and was very favorably received.

Dr. Hubert Schull of Texarkana brought out many excellent points in the production of clean milk for the home and market, at the same time clearly demonstrating the immense services practicing veterinarians may perform in conserving public health.

At the evening session Dr. D. F. Luckey, Livestock Commissioner, Livestock Exchange St. Louis, gave an illustrated lecture on tuberculosis convincing his audience of veterinarians and stock men that tuberculosis causes considerable economic losses, is a menace to public health and that the merits of tuberculosis eradication work are such as to urge its early eradication. Dr. B. H. Ranson, Chief of the Zoological Division of the Bureau of Animal Industry, Washington, D. C., gave an illustrated lecture on common intestinal parasites of swine which was very highly instructive and interesting, especially the work relative to the life history of the common round worm.

A constitution and by-laws was adopted at the morning session on October 12. A well prepared paper of Dr. J. S. Schilling of the State College of Agriculture on the preparation of material for laboratory examination prompted considerable discussion illustrating the import of the laboratory in arriving at a diagnosis of diseases or conditions.

President Wilson ably discussed infectious abortion of swine. His experiences corroborating that of others, namely, the importance of quarantine and sanitation.

Dr. H. J. Hayes of Helena briefly discussed barium chloride and its uses. The President suggested an open discussion in

which Dr. Hayes brought up the subject of tetanus, with discussions by Drs. Luckey, Schull, Kittrell and Wilson. Drs. Wilson brought up and discussed briefly the subject of swamp fever. After the election of Dr. Earl Kittrell as President and J. H. Bux, Secretary-Treasurer, the meeting adjourned.

JOE H. BUX, *Secretary*.

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### CONNECTICUT VETERINARY MEDICAL ASSOCIATION

The Connecticut Veterinary Medical Association held its quarterly meeting at the Hotel Elton in Waterbury, Wednesday, November 1. The following members and visitors were present:

Commissioner on Domestic Animals James M. Whittlesey, R. L. Smith, Inspector in Charge, Bureau of Animal Industry, Grove Loveland, V. M. Knapp, M. Ray Powers, Charles L. Colton, A. T. Gilyard, B. D. Radcliffe, A. W. Sutherland, F. M. Page, Harrison Whitney, C. A. Burnette, I. R. Vail, George T. Crowley, Benjamin Pennell, Thomas Bland, Peter T. Keeley, J. L. Devereaux, Edwin Laitinen, E. L. Thornton, Geo. E. Corwin.

Visitors: Dr. H. W. Jakeman, Pitman-Moore Laboratories; and Professor G. H. Lamson, Jr., Zoologist, Connecticut Agricultural College.

After the regular order of business a very interesting program was presented as follows: Fracture of the lower jaw of the dog, showing X-ray pictures, both before and after fixation with wire sutures, by Dr. Edwin Laitinen; Duties of the State Board of Examination and Registration, and Its Relation to the Association, by Dr. Charles L. Colton; Nicotine Sulphate: A Vermicide for the Sheep Stomach Worm, by Professor G. H. Lamson, Jr., Zoologist, Storrs Agricultural Experiment Station. Dr. Jakeman gave a very interesting talk on Antitoxins, Serum Therapy, and Immunology. All these cases and papers were of a very interesting nature and ably presented.

The advanced bulletin and information on "Nicotine Sulphate: A Vermicide for the Sheep Stomach Worm," by Professor Lamson, was the first information on this subject of its kind, and was an important adjunct to the program. The information it contained and the practical results given were ably presented.

GEO. E. CORWIN, *Secretary*.

### NEVADA STATE VETERINARY ASSOCIATION

The association's semi-annual meeting for 1922 was held October 14, in Reno. More than 50 per cent of its small membership was present.

The forenoon session in charge of Dr. J. R. Beach of the University of California was devoted to a general presentation and discussion of poultry diseases.

After lunch the members attended the football game between Occidental College of Los Angeles and the University of Nevada on the MacKay Field of the University.

At six p. m. a buffet supper at the Women's Twentieth Century Club brought the members together again for the evening session.

A round table on cattle scabies, further discussion on poultry diseases and an exchange of field veterinary experiences occupied the evening.

S. LOCKETT, *Secretary.*

### BRITISH COLUMBIA VETERINARY ASSOCIATION

The President and Secretary of the B. C. Veterinary Association received copies of the proposed Milk By-Law of the City of Vancouver, from the City Medical Health Officer, inviting criticism and suggestions for improvement, to be presented at a meeting later. The Council proposed an amendment to the definition of the word "disease," which they considered inadequate, and on receipt of the invitation to attend the meeting, which was held in the courthouse September 27, Dr. Damman, as President of the B. C. Veterinary Association, was called upon to explain the amendment, which he did, and it was adopted. Other veterinarians took part in the discussion. The chairman was Dr. Young, Chairman of the Provincial Board of Health; and there were present Medical Health Officers of Victoria and Vancouver, members of the Vancouver Medical Association, Professor Sadler of the University of British Columbia, Mr. Berry, President of the Fraser Valley Milk Producers' Association, and other prominent dairymen and farmers, and also representatives of the City Health Department, and women's organizations, and the general public. The *Vancouver Province* devoted two columns next day to the meeting, in which the veterinary profession was given equal prominence with the other professions represented.



### THE NEW ONTARIO VETERINARY COLLEGE

The official opening of the new Ontario Veterinary College at Guelph, Canada will take place on the afternoon of Tuesday, December 12. This date has been selected as the Guelph Winter Fair is being held at the same time. The official ceremony will commence at 2:30 in the afternoon followed by a banquet during the evening. While the list of speakers has not as yet been definitely decided upon it is hoped that the following may be able to attend and deliver addresses:—Hon. E. C. Drury, Premier of Ontario; Hon. Manning W. Doherty, Minister of Agriculture for Ontario; Hon. W. R. Motherwell, Minister of Agriculture for the Dominion, or his Deputy; Hon. S. F. Tolmie, M. P.; Sir Robert Falconer, President of the University of Toronto; Dr. J. G. Rutherford, Board of Railway Commissioners, Ottawa; Dr. F. Torrance, Veterinary Director General, Ottawa; Dr. J. R. Mohler, Chief of the United States Bureau of Animal Industry; President J. B. Reynolds, Ontario Agricultural College and W. B. Roadhouse, Deputy Minister of Agriculture for Ontario.

On an occasion of this kind it is not possible to send a personal invitation to every Veterinary Surgeon and this announcement should be considered as a cordial general invitation to everyone to attend, and it is hoped that many veterinarians and their friends will avail themselves of this invitation to be present at the official opening. This invitation is extended by the Department and by the Faculty of the College and it is hoped that a good representation from the profession will be present. Everyone is welcome and the college staff will be pleased to extend a cordial greeting to those attending. Keep the date in mind and decide to be present.

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### CALIFORNIA PRACTITIONERS' WEEK

The California Veterinary Practitioners' Week, arranged jointly by the California Veterinary Medical Association and the Division of Veterinary Science of the University of California, will be held at the University Farm, Davis, January 2 to 5, 1923.

Three special veterinarian lecturers from the East will be present at the meeting. Dr. W. E. Muldoon, from the Kansas

State Veterinary College, will lecture on "Therapeutics and Small Animals Practice." Dr. Adolph Eichhorn, from the Lederle Antitoxin Laboratories, will talk on "Rabies" and "Anthrax." Dr. J. F. DeVine, of the Goshen Laboratories, will talk on "Abortion and Sterility in Cattle and Horses."

Members of the staff of the College of Agriculture of the University will participate in the program, as well as a number of practitioners in the State.

The program has been arranged by the committee along the lines desired by the practitioners in California and a large attendance is expected. The course is open to all graduate veterinarians and such men in near-by states are cordially invited to attend.

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#### **NEW YORK CONFERENCE FOR VETERINARIANS**

The fifteenth annual conference for veterinarians will be held at the New York State Veterinary College at Cornell University, Ithaca, N. Y., on January 11 and 12. An instructive program will be provided.

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#### **OHIO VETERINARY MEDICAL ASSOCIATION**

The Ohio State Veterinary Medical Association will hold its annual meeting on January 31, February 1 and 2, 1923, consisting of one full day for papers and discussions, and also a full day devoted for a clinic. The clinic will be divided into five sections, namely for horses, cattle, hogs, small animals and poultry.

The business session will take place on Jan. 31 at the Deshler Hotel, where the annual banquet will be held on Feb. 1. The rest of the meeting, consisting of the clinic and the papers read will be held at the Veterinary Department of the Ohio State University.

This is to be a truly Ohio meeting, all taking part being residents of Ohio. It is also a meeting especially arranged for the practitioner, so all that attend can look forward to an instructive, as well as a good social and fraternal treat.

Out-of-State veterinarians are welcome; come and let us make you feel at home.

**HARRY T. MOSS, *Secretary.***

## COMMUNICATIONS

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### GREETINGS FROM CUBA

Havana, Oct. 27, 1922.

MY DEAR AND GOOD FRIEND DR. EICHHORN :

Since I knew you were back from your splendid tour around Europe, I have been thinking to write you.

As you must imagine, I have read in the JOURNAL your report of the trip to Cuba as delegate of the American Veterinary Medical Association to our National Congress, and you may be sure, Dr. Eichhorn, that all the Cuban veterinarians, and particularly those of the Army Service whom you met here, want to express to you their gratitude for what you have said in your report about the professional work that we are carrying on in Cuba with veterinary science.

The good relationship among the American and Cuban associations have been established through you forever, and the friends that your scientific and social characteristics have acquired while on your trip to this country are interested in your own success, thus adding one more page to our professional fraternity.

Allow me, then, to felicitate you in the name of my friends, and be sure of my personal devotion and reciprocal sentiments.

I remain,

Your devoted servant,

ANGEL IDUATE,

*President, Cuban Veterinary Medical Association.*

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### A CORRECTION

TO THE EDITOR :

In your November issue on page 269 you quote me as saying "the more purebred blood coursing in the animal's veins the better able he was to stand the test." I wish to say that the word "purebred" should read "thoroughbred." Kindly make correction.

A. J. SAVAGE.

Colorado Springs, Colo.

## MISCELLANEOUS

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### THOROUGHBRED FIRST, MORGAN SECOND IN ENDURANCE RIDE

The fourth annual 300-mile endurance ride, conducted in mid-October under the supervision of a number of organizations interested in the development of horses with speed and endurance under the saddle, was won by Vendetta, a Thoroughbred mare owned by J. Watson Webb, of Vermont. Second rating was given to Gladstone, a purebred Morgan gelding bred and raised at the United States Morgan Horse Farm, Middlebury, Vt.

The course followed this year was entirely within the New England States, beginning and ending at Fort Ethan Allan, Vermont. At times during the ride weather conditions were severe. Out of a total of 21 entries only 9 horses finished the contest, the others having been taken out because of lameness, accident, or fatigue. Of the 6 horses that were awarded prizes, two were Thoroughbreds, one a purebred Morgan, one a grade American Saddle horse, one an Irish Hunter, and one a Thoroughbred-Standardbred cross. In the opinion of horsemen who witnessed the start of the ride, the entries this year were of better average quality and in far better condition than in any of the previous contests.

In this endurance ride the perfect score for speed is given for a record of 45 hours for the trip, or 9 hours for each of the 5 days. The longest time permissible for a contestant is 55 hours for the trip, or 11 hours for each day. Each horse carries 225 pounds and each rider is required to feed and care for his mount.

Of the 21 horses which started, four were Thoroughbreds, two were purebred Morgans, four grade Morgans, one purebred Arabian, six of Arabian breeding, one purebred American Saddle, one grade American Saddle, one Irish Hunter, and one crossbred.

The object of this endurance ride, which is approved by the War Department, the Chief of the Remount Service, and the Chief of the Bureau of Animal Industry, is to stimulate interest in good saddle horses, possessed of stamina, and hardiness,

and suitable for use in the mounted service of the United States Army. The annual endurance ride is managed by a committee made up of one representative each from the Arabian Horse Club of America, The Morgan Horse Club, The National Steeple Chase and Hunt Association, The American Hackney Horse Society, The Thoroughbred Endurance Test Club, The National Saddle Horse Club, The American Remount Association, The Horse Association of America, the Bureau of Animal Industry, other interested organizations, and the two donors of the prizes.

Gladstone, the purebred Morgan awarded second place this year, is a half brother to the famous Castor, Government Morgan that finished with very creditable records in the three previous rides. Both are by the stallion General Gates 666. Gladstone was the smallest horse to finish the contest, weighing at the start 924 pounds. He was foaled in 1913. Up to this fall he had been used at various jobs on the U. S. Experiment Farm, Beltsville, Md., and for some time as one of a pair on the carriage of the Secretary of Agriculture in Washington, D. C.

The following table gives the winners in the order of their rating on the basis of condition and speed:

| <i>Name</i>     | <i>Breeding</i>   | <i>Weight</i> | <i>Total time</i>  |
|-----------------|-------------------|---------------|--------------------|
| Vendetta.....   | Thoroughbred .... | 1,012.5       | 45 hrs. 17 minutes |
| Gladstone.....  | Morgan .....      | 922.5         | 45 " 58 "          |
| Grant.....      | Gr. Am. Saddle..  | 1,185         | 45 " 25 "          |
| Cragmore.....   | Thoroughbred-St.. | 1,032.5       | 45 " 20 "          |
| Pathfinder..... | Thoroughbred ...  | 990           | 45 " 34 "          |
| Clonmell.....   | Irish Hunter..... | 1,050         | 45 " 20 "          |

### PIG SURVEY TO COVER WHOLE COUNTRY

The second semi-annual pig survey, cards for which are now being distributed to rural mail carriers, will cover the entire country. The survey last spring covered only 17 States, but as an indication of present and probable pig production the survey was a great success and readily demonstrated the feasibility of extending the scope of the inquiry.

Ten cards or questionnaires will be distributed by each rural mail carrier on agricultural routes. Approximately 50,000 cards will be sent out. They have been prepared in simple form and can be filled out in a few minutes. Where possible, the mail carriers will fill in the answers as made by the hog raisers. The cards will show the number of sows farrowed during the last



six months of 1921, the number farrowed during the first six months of 1922, the number of sows farrowed, or due to farrow, during the last six months of 1922, and the number bred or intended to be bred to farrow during the first six months of 1923. Numbers of hogs which died from hog cholera or other diseases during 1921 and 1922 will be shown, as well as the number of pigs saved per litter.

The importance of this survey to the farmers in enabling them to adjust their production to the probable needs of the market is quite evident. People who deal in crops and livestock, such as packers and commission men, have very extensive organizations for informing themselves of the production of crops and livestock. Obviously information of this character is just as important to the farmers as to the people who deal in farm products.

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#### DAIRYMEN FINANCE LOCAL FIGHT ON TUBERCULOSIS

In Lyme township, Huron County, Ohio, owners of dairy cattle organized an association through which they financed their own campaign against tuberculosis when State and Federal indemnity funds had run out. The members were assessed \$2 a head for grades and \$4 a head for purebreds, one-fourth being used for organization work and the rest for paying indemnities. The association has tested 83 herds containing 662 cattle, 26 of which reacted. The owners of the reactors received the salvage value of the animals and a straight indemnity of \$20 a head for grades. For purebreds the indemnity was doubled. About 85 per cent of the herds in the township were tested.

The organizing of this association indicates the anxiety of many progressive dairymen to get rid of tuberculosis. These Ohio men might have waited for more funds to be appropriated by the State and Congress, but they felt they could well afford to pay out the money themselves to hurry the work and advertise their locality as free of the disease.

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Dr. M. L. Olsen, a recent graduate of the Colorado Veterinary College, motored from Denver, Colo., to New Westminster, B. C., and has taken the examination to become licensed to practice in British Columbia, and has located at Duncans, V. I., B. C.

